Geelstert Grid Connection

Northern Cape Province

(DEFF Ref.: 14/12/16/3/3/1/2223)

Final Basic Assessment Report

November 2020

savannah environmental

t +27 (0)11 656 3237
f +27 (0)86 684 0547
e info@savannahsa.com
w www.savannahsa.com

Prepared for:

ABO Wind renewable energies (Pty) Ltd
Unit B1
Mayfair Square
Century Way
Century City
7441

Prepared by:

savannah environmental
t +27 (0)11 656 3237 f +27 (0)86 684 0547 e info@savannahsa.com w www.savannahsa.com
First Floor, Block 2, 5 Woodlands Drive Office Park, Cnr Woodlands Drive & Western Service Road, Woodmead, 2191

PROJECT DETAILS

Title	:	Basic Assessment Process: Final Basic Assessment Report for Geelstert Grid Connection, a grid connection infrastructure development near Aggeneys, in the Northern Cape Province.
Authors	:	Savannah Environmental (Pty) Ltd Reuben Maroga Lisa Opperman Jo-Anne Thomas Nicolene Venter
Client	:	ABO Wind renewable energies (Pty) Ltd
Report Revision	:	Revision 0
Date	:	November 2020

When used as a reference this report should be cited as: Savannah Environmental (2020) Final Basic Assessment for the Geelstert Grid Connection, Northern Cape Province.

PURPOSE OF THE BA REPORT AND INVITATION TO COMMENT

ABO Wind renewable energies (Pty) Ltd, proposes the construction and operation of a grid connection for two proposed solar PV facilities located south-east of Aggeneys in the Northern Cape Province. The project is known as the Geelstert Grid Connection and the proposed infrastructure will include the development of a collector substation, a double-circuit power line (up to 220kV in capacity) and a single-circuit power line (up to 220kV in capacity) to connect the proposed Geelstert 1 and Geelstert 2 solar PV facilities[1] and the authorised Aggeneys 1 and Aggeneys 2 collector substations to the Aggeneis Main Transmission Substation (MTS).

In terms of NEMA, the EIA Regulations, 2014 (GNR 326), and Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)), the development of the Geelstert Grid Connection requires Environmental Authorisation (EA) from the National Department of Environmental Affairs (DEA) (now known as the Department of Environment, Forestry and Fisheries (DEFF)) subject to the completion of a Basic Assessment process, as prescribed in Regulations 21 to 24 of the EIA Regulations, 2014 (GNR 326. The need for EA subject to the completion of Basic Assessment process is triggered by the inclusion of, amongst others, Activity 9(i) of Listing Notice 1(GNR 327).

The BA Report was made available for review from **Thursday, 20 August 2020** to **Monday, 21 August 2020**, and was made available for download, review, and comment on the Savannah Environmental website at: www.savannahsa.com/public-documents/energy-generation/geelstert-1-and-geelstert-2-solar-pv-facilities-and-associated-grid-connection/.

All comments received during the 30-day review and comment period has been recorded, included and addressed (where relevant) within this final BA Report which is submitted to DEFF for decision-making on the Application for Environmental Authorisation.

[1] These projects comprise the development of two 125MW solar PV facilities and are subject to separate Basic Assessment (BA) processes.

EXECUTIVE SUMMARY

ABO Wind renewable energies (Pty) Ltd, proposes the construction and operation of a grid connection for two proposed solar PV facilities located south-east of Aggeneys in the Northern Cape Province. The project is known as the Geelstert Grid Connection and the proposed infrastructure will include the development of a collector substation, a double-circuit power line (up to 220kV in capacity) and a single-circuit power line (up to 220kV in capacity) to connect the proposed Geelstert 1 and Geelstert 2 solar PV facilities[2] and the authorised Aggeneys 1 and Aggeneys 2 collector substations to the Aggeneis Main Transmission Substation (MTS).

A 17.5km long and 1km wide (extending to 2km at the Aggeneis Main Transmission Substation (MTS)) grid connection corridor has been assessed to allow for the optimisation of the grid connection infrastructure and to accommodate the environmental sensitivities identified within the corridor. .

The development of the Geelstert Grid Connection (as assessed within this final Basic Assessment (BA) Report) is considered to be necessary associated infrastructure required for the operation of the Geelstert 1 and Geelstert 2 solar PV facilities, and is therefore also developed in response to identified objectives of the national and provincial governments, and local and district municipalities to develop renewable energy facilities for power generation purposes. The grid connection corridor is located within the Springbok Renewable Energy Development Zone (REDZ) or REDZ 8, and within the Northern Corridor of the Strategic Transmission Corridors.

The full length of the assessed grid connection corridor traverses the following properties, namely:

- Remaining Extent of the Farm Bloemhoek 61
- Remaining Extent of the Farm Aggeneys 56
- Remaining Extent of Portion 1 of the Farm Aggeneys 56
- Portion 2 of the Farm Aggeneys 56
- Portion 12 of the Farm Aggeneys 56
- Portion 13 of the Farm Aggeneys 56

[2] These projects comprise the development of two 125MW solar PV facilities and are subject to separate Basic Assessment (BA) processes.

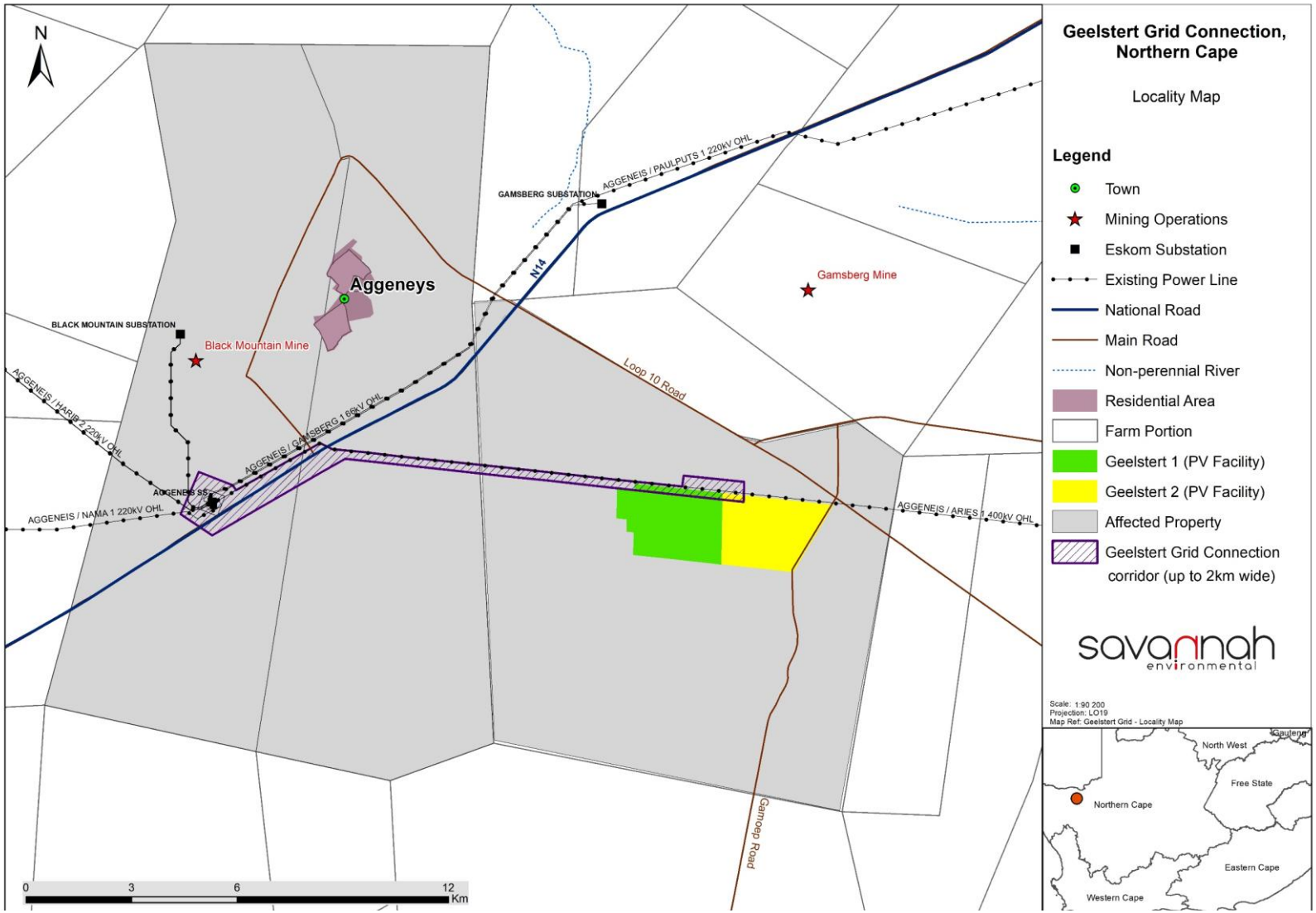

Figure 1: Locality map illustrating the location of the grid connection corridor for the development of the Geelstert Grid Connection.

No environmental fatal flaws or impacts of high significance were identified in the detailed specialist studies conducted, and no impacts of unacceptable significance are expected to occur with the implementation of the recommended mitigation measures. These measures include, amongst others, the avoidance of sensitive features as specified by the specialists.

The potential environmental impacts associated with the grid connection infrastructure identified and assessed through the BA process include:

- Impacts on ecology, flora and fauna.
- Impacts on avifauna.
- Impacts on freshwater features.
- Impacts to soils and agricultural potential.
- Impacts on heritage resources, including archaeology and palaeontology.
- Visual impacts on the area as a result of the grid connection infrastructure.
- Social impacts.

Impacts on Ecology

The Ecological Impact Assessment (**Appendix D**) is based on the findings of three full field assessments undertaken in June 2018, March 2019, and June 2020. The ecological impacts identified to be associated with the development of the Geelstert Grid Connection will be negative and local in extent. The duration of the construction phase will be short-term and operation phase impacts will be long-term for the lifetime of the grid connection infrastructure.

Impacts during the construction, operation, and the decommissioning phases include impacts on vegetation and protected plants; direct faunal impacts; and habitat degradation due to soil erosion due to alien plant invasion. The significance of the construction, operation and decommissioning phase impacts will be low, following the implementation of the recommended mitigation measures by the specialist. No impacts of a high or medium significance were identified following the implementation of the recommended mitigation measures.

From the findings of the Ecological Impact Assessment (refer to **Appendix D**), it can be concluded that the grid connection corridor assessed for the development of the Geelstert Grid Connection is acceptable from an ecological perspective. As a result, there are no specific long-term impacts associated with the grid connection infrastructure that cannot be reduced to an acceptable level through mitigation and avoidance. Furthermore, there are no high residual impacts or fatal flaws associated with the development, and the project can be supported from an ecological perspective. The specialist has therefore indicated that the Geelstert Grid Connection should be authorised, subject to the implementation of the recommended mitigation measures.

Impacts on Avifauna

The Avifauna Impact Assessment (**Appendix E**) is based on the findings of three full field assessments undertaken in June 2018, March 2019, and June 2020. The impacts on avifauna identified and associated with the development of the Geelstert Grid Connection will be negative and local in extent. The duration of the construction and decommissioning phase impacts will be short-term. The duration of the operation phase impacts will be long-term for the lifetime of the grid connection infrastructure.

The impacts identified for the construction, operation and decommissioning phases for the Geelstert Grid Connection include direct impacts to avifauna, and collisions and electrocutions of avifauna species with the grid connection infrastructure. The most significant mitigation measure is the avoidance/spanning of sensitive habitats for raptors as well as the Red Lark. The significance of the construction and operation phase impacts will be low following the implementation of the recommended mitigation measures.

From the findings of the Avifauna Impact Assessment (**Appendix E**), it can be concluded that with the implementation of the recommended mitigation measures, the identified impacts from an avifauna perspective associated with the Geelstert Grid Connection can be reduced to acceptable levels. No long-term impacts of a high significance are expected, and no fatal flaws were identified from an avifauna perspective. As a result, the specialist has indicated that the development of the Geelstert Grid Connection is supported and can be authorised, subject to the implementation of the recommended mitigation measures.

Impacts on Freshwater Features

The findings of the Freshwater Resource Study and Assessment (**Appendix F**) is based a field-survey undertaken in July 2020. The identified impacts of the Geelstert Grid Connection on freshwater features present within the grid connection corridor will be negative and local in extent. The duration of the construction (including decommissioning) will be short-term. The impacts for the operation phase will be long-term for the lifetime of the grid connection infrastructure.

The impacts identified from a freshwater perspective for the construction, operation and decommissioning phases for the Geelstert Grid Connection include loss and disturbance of habitats and fauna, impacts on localised surface water quality and an increased risk of sedimentation and erosion extending throughout the operation phase of the grid connection infrastructure. The most significant mitigation measure is the avoidance of sensitive habitats and freshwater features, including ephemeral streams and depression wetlands. The significance of the construction (including decommissioning) and operation phase impacts will be low, following the implementation of the recommended mitigation measures.

From the findings of the Freshwater Resource Study and Assessment (**Appendix F**), it can be concluded that with the implementation of mitigation measures, the identified impacts from a freshwater perspective can be reduced to acceptable levels. No long-term impacts of a high significance are expected to occur, and no fatal flaws were identified from a freshwater perspective. As a result, the specialist has indicated that the development of the Geelstert Grid Connection is supported and can be authorised, subject to the implementation of the recommended mitigation measures.

Impacts on Soil and Agricultural Potential

The Soils and Agricultural Potential Impact Assessment (**Appendix G**) is based on the findings of a field assessment undertaken in November 2018. The impacts to soil identified to be associated with the Geelstert Grid Connection will be negative and local in extent. The duration of the impacts will be short-term for the construction (including decommissioning) phase. The operation phase impacts will have a long-term duration for the lifetime of the grid connection infrastructure.

The impacts identified from a soils and agricultural potential perspective for the construction (including decommissioning) and operation phases for the Geelstert Grid Connection include loss of agricultural land and soil erosion. The significance of the construction (including decommissioning) and operation phase impacts will be low subject to the implementation of the recommended mitigation measures.

From the findings of the Soils and Agricultural Potential (**Appendix G**), it can be concluded that with the implementation of the recommended mitigation measures, the identified impacts from a soils and agricultural potential perspective can be reduced to acceptable levels. No long-term impacts of a high significance are expected to occur, and no fatal flaws were identified from a soils and agricultural potential perspective. As a result, the specialist has indicated that the development of the Geelstert Grid Connection can be authorised from a soils and agricultural potential perspective.

Impacts on Heritage Resources (including archaeology and palaeontology)

The Heritage Report (**Appendix H** and **Appendix H1**) indicated that the impacts anticipated as a result of the Geelstert Grid Connection will be neutral and local in extent. The duration of the impacts will be short-term for the construction (including decommissioning) phase. No operation phase impacts were assessed for the Geelstert Grid Connection from a heritage perspective.

Heritage impacts during the construction phase of the Geelstert Grid Connection include an impact on the significant archaeological, built environment resources, however this impact is unlikely to occur owing to the lack of significant heritage sites located within the grid connection corridor. Heritage sites are, however, present within the surrounding landscape of the grid connection corridor. In addition, the bedrock associated with the Aggeneys area and the grid connection corridor is mainly unfossilferous and is of no palaeontological interest. As a result, the impact of the Geelstert Grid Connection on heritage and palaeontological resources is of low significance. Therefore, there are no fatal flaws associated with the development of the grid connection infrastructure from a heritage perspective. In conclusion, the specialist has indicated that the development of the Geelstert Grid Connection is supported from a heritage perspective, subject to the implementation of the recommended mitigation measures.

Visual Impacts

The Visual Impact Assessment (**Appendix I** and **Appendix I1**) is based on the findings of a field assessment undertaken in January 2019. The duration of the construction phase impacts will be short-term and local in extent. The operation phase impacts will be local in extent, with a long-term duration for the lifetime of the grid connection infrastructure.

The Visual Impact Assessment identified negative impacts on visual receptors for the construction and the operation phases of the Geelstert Grid Connection. The impacts include a change in the character of the general landscape in the Aggeneys area; a change in the character of the landscape as seen from the N14, the Loop 10 and Gamoep roads; the local homestead located to the north-east of the grid connection corridor; and the residents of Aggeneys. The significance of the impacts will be low with the implementation of the recommended mitigation measures. No impacts of a high or medium significance and fatal flaws are expected to occur following the implementation of the recommended mitigation measures.

From the findings of the Visual Impact Assessment, it is concluded that the development of the Geelstert Grid Connection will largely impact visually on an area where there is currently a strong visual influence of existing grid connection infrastructure (i.e. power lines and substations, etc.) and mining developments (i.e. Gamsberg and Black Mountain Mine), and therefore changes to the landscape as a result of the Geelstert Grid Connection are unlikely to be visually intrusive. As a result, no fatal flaws are anticipated from a visual perspective. In conclusion, the specialist has indicated that the development of the Geelstert Grid Connection is considered acceptable from a visual perspective and can be authorised.

Social Impacts

The Social Impact Assessment (**Appendix J**) identified that most social impacts associated with the development of the Geelstert Grid Connection will have a short-term duration associated with the construction phase (including decommissioning) and long-term duration during the operation phase of the project. Both positive and negative impacts have been identified for both the construction and operation phases of the grid connection infrastructure.

During the construction phase, negative impacts include an influx of jobseekers and a change in the population of the area; safety and security impacts; impacts on daily living and movement patterns; and nuisance impacts, which include noise and dust. The significance of the negative construction phase impacts will be low, within the implementation of the recommended mitigation measures by the specialist. The positive social impacts of the construction phase includes the creation of direct and indirect employment opportunities. The significance of the positive impacts will be medium following the implementation of the recommended enhancement measures.

Social impacts associated with the operation of the Geelstert Grid Connection will be both positive and negative. The negative impacts are related to an influx of jobseekers and a change in the population within the Aggeneys area; and to the transformation in the sense of place of the surrounding landscape. The negative impacts will be of a low significance with the implementation of the recommended mitigation measures. The positive impacts for the operation phase of the grid connection infrastructure will include the creation of employment opportunities and skills development opportunities for the local economy and country. The significance of the positive social impacts during the operation phase will be low, with the implementation of the recommended enhancement measures.

From a social perspective, it is concluded that the development of the Geelstert Grid Connection is acceptable subject to the implementation of the recommended mitigation measures. There are no fatal flaws associated with the development of the grid connection infrastructure and the specialist has indicated that the development of the Geelstert Grid Connection can be supported from a social perspective.

Assessment of Cumulative Impacts

The cumulative impacts of the Geelstert Grid Connection and other known grid connection infrastructure and renewable energy projects in the surrounding area have been qualitatively assessed. There is currently one operational solar PV facility located in the vicinity of the grid connection corridor and seven others proposed. In terms of grid connection infrastructure, there are currently six existing power lines and three substations (including the Aggeneis MTS) within the vicinity of the grid connection corridor.

The assessed grid connection corridor is located within a Strategic Transmission Corridor (i.e. the Northern Transmission Corridor, as well as a Renewable Energy Development Zone (REDZ) (i.e. the Springbok REDZ). These areas form part of the areas identified by the DEFF as geographical areas of strategic importance for the development of commercial renewable energy developments (REDZ) and large-scale grid infrastructure development projects (power transmission corridors). Therefore, the area is considered to be a node for the development of renewable energy and grid infrastructure.

Figure 2 provides an environmental sensitivity map of the preferred layout for the Geelstert Grid Connection.

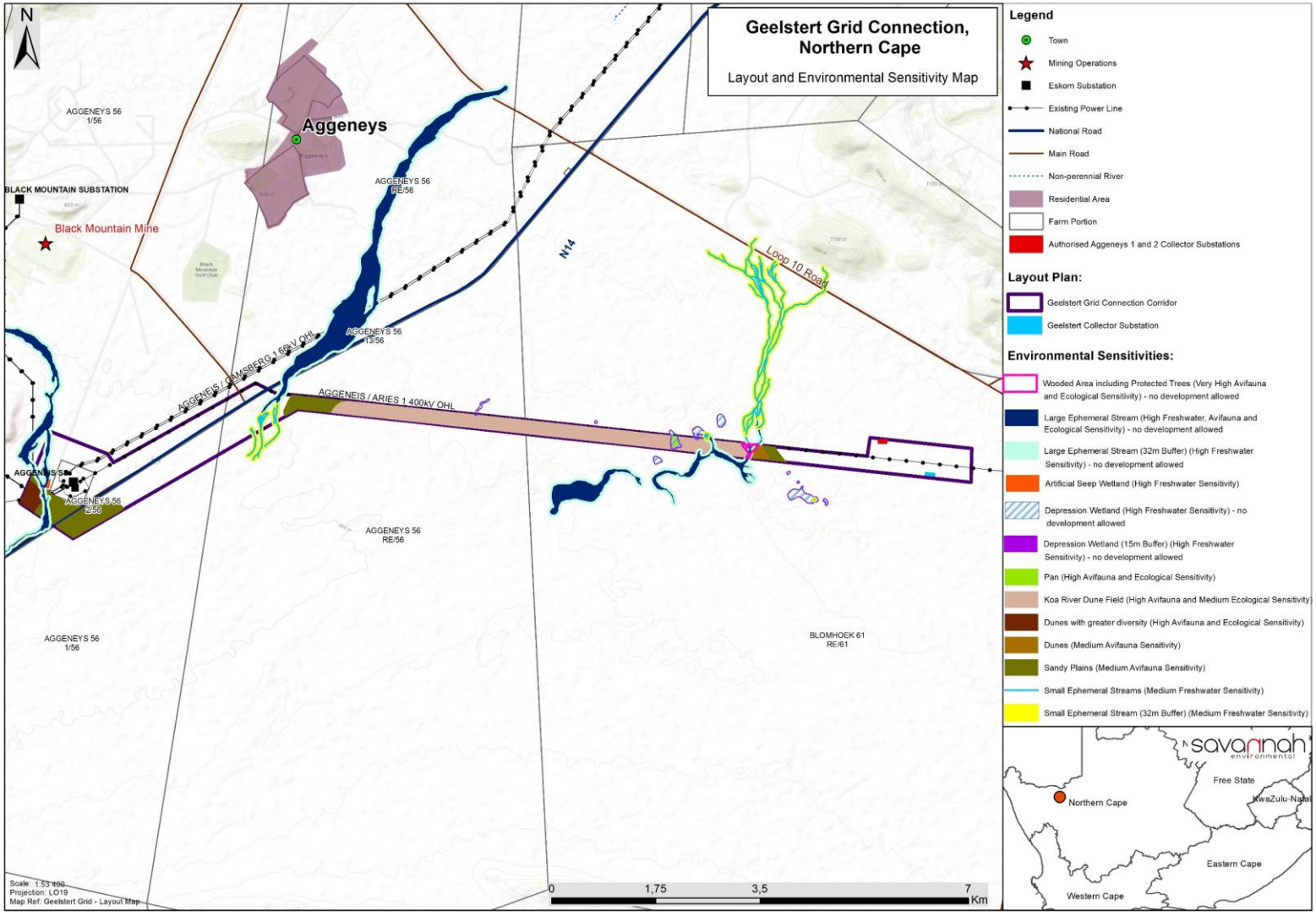

Figure 2: Final preferred layout map of the preferred grid connection corridor for the Geelstert Grid Connection, as was assessed as part of the BA process, overlain with the environmental sensitivities (refer to **Appendix N** for A3 maps)

DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Archaeological material: Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation, or maintenance of an activity and are generally obvious and quantifiable.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Emergency: An undesired/ unplanned event that results in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Authorisation (EA): means the authorisation issued by a competent authority (Department of Environmental Affairs) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) and the EIA Regulations promulgated under the Act.

Environmental assessment practitioner (EAP): An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

Environmental assessment practitioner (EAP): An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment, as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental Management Programme (EMPr): A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a project or facility and its ongoing maintenance after implementation.

Environmental Officer (EO): The Environmental Officer (EO), employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. The EO must act as liaison and advisor on all environmental and related issues

and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

Habitat: The place in which a species or ecological community occurs naturally.

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Incident: An unplanned occurrence that has caused, or has the potential to cause, environmental damage.

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place because of the activity.

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

Method Statement: a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance

Mitigation hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities.

No-go areas: Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

Photovoltaic effect: Electricity can be generated using photovoltaic solar panels which are comprised of individual photovoltaic cells that absorb solar energy to directly produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Pre-construction: The period prior to the commencement of construction, this may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Riparian: the area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas which are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian wetlands. However, some riparian areas are not wetlands (e.g. an area where alluvium is periodically deposited by a stream during floods, but which is well drained).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

Waste: as per the NEM: Waste Amendment Act, 2014 (Act No. 26 of 2014)

(a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3.
(b) any other substance, material or object that is not included in Schedule 3 that may be defined as awaste by the Minister by notice in the *Gazette*,

but any waste or portion of waste, referred to in paragraph (a) and (b), ceases to be a waste –

(i) once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;
(ii) where approval is not required, once a waste is, or has been re-ised, recycled or recovered;
(iii) where the Minister has, in terms of section 74, exempted any waste or a portion of wase generated by a particular process from the definition of waste; or
(iv) where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste.

ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
DAFF	Department of Agriculture, Forestry and Fisheries
dB	Decibels
DAEARD&LR	Northern Cape Department of Agriculture, Environmental Affairs, Rural Development & Land Reform
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DENC	Northern Cape Department of Environment and Nature Conservation
DoE	Department of Energy
DMRE	Department of Mineral Resources and Energy
EAP	Environmental Impact Practitioner
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
GPS	Global Positioning System
GWh	Giga Watt hour
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
MW	Mega Watt
NEMA	National Environmental Management Act
NEMAA	National Environmental Management Amendment Act
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NWA	National Water Act
PM	Post Meridiem; "Afternoon"
SAHRA	South African National Heritage Resources Agency
SWMP	Stormwater Management Plan

TABLE OF CONTENTS

APPENDICES LIST

Appendix A: Curriculum Vitae
Appendix B: Correspondence with Authorities
Appendix C: Public Participation Process
Appendix C1 *Public Participation Plan*
Appendix C2: *I&AP Database*
Appendix C3: *Site Notices and Advertisements*
Appendix C4: *Background Information Document*
Appendix C5: *Organs of State Correspondence*
Appendix C6: *Stakeholder Correspondence*
Appendix C7: *Comments Received*
Appendix C8: *Minutes of Meetings*
Appendix C9: *Comments and Responses Report*
Appendix D: Ecology Impact Assessment
Appendix E: Avifauna Impact Assessment
Appendix F: Freshwater Resource Study and Assessment
Appendix G: Soils and Agricultural Potential Impact Assessment
Appendix H: Heritage Report
Appendix H1: *Heritage Impact Assessment*
Appendix I: Visual Impact Assessment
Appendix I1: *Visual Input Letters*
Appendix J: Social Impact Assessment
Appendix J(a): *Social Impact Assessment Review Letter*
Appendix K: Screening Report
Appendix L: Environmental Management Programme (EMPr)
Appendix A: *Curriculum Vitae*
Appendix B: *Chance Find Protocol*
Appendix C: *Search and Rescue Plan*
Appendix D: *Alien Plant and Open Space Management Plan*
Appendix M: EAP Affirmation and Specialist Declarations
Appendix N: A3 Maps
Appendix O: Additional Information

CHAPTER 1: INTRODUCTION

ABO Wind renewable energies (Pty) Ltd, proposes the construction and operation of a grid connection for the proposed Geelstert 1 and Geelstert 2 solar PV facilities located south-east of Aggeneys in the Northern Cape Province. The project is known as the Geelstert Grid Connection and the proposed infrastructure will include; the development of a collector substation and a double-circuit power line (up to 220kV in capacity) to connect the proposed Geelstert 1 and Geelstert 2 solar PV facilities[3] and a single-circuit power line (up to 220kV) to connect the Aggeneys 1 and Aggeneys 2 collector substations to the Aggeneis Main Transmission Substation (MTS).

A 17.5km long and 1km wide (extending to 2km at the Aggeneis Main Transmission Substation (MTS)) grid connection corridor is being assessed to allow for the optimisation of the grid connection infrastructure and to accommodate the environmental sensitivities identified within the corridor (refer to **Figure 1.1**).

The development of the Geelstert Grid Connection (as assessed within this final Basic Assessment (BA) Report) is considered to be necessary associated infrastructure required for the operation of the Geelstert 1 and Geelstert 2 solar PV facilities and is therefore also developed in response to identified objectives of the national and provincial governments, and local and district municipalities to develop renewable energy facilities for power generation purposes. The grid connection corridor is located within the Springbok Renewable Energy Development Zone (REDZ) or REDZ 8, and within the Northern Corridor of the Strategic Transmission Corridors.

The nature and extent of the grid connection corridor, as well as the potential environmental impacts associated with the construction, operation and decommissioning phases of infrastructure of this nature are explored in detail in this final BA Report. Site specific environmental issues and constraints within the grid connection corridor are considered within independent specialist studies in order to test the environmental suitability of the corridor for the development of the grid connection infrastructure. The specialist studies delineate areas of sensitivity and ultimately inform the placement of the power line and collector substation (and associated infrastructure) with the grid connection corridor.

This final BA Report has been prepared in accordance with the requirements of the Appendix 1 of the EIA Regulations published on 08 December 2014 (as amended in April 2017) promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998). This report consists of the following sections:

- **Chapter 1** provides background to the proposed grid connection project and the BA process.
- **Chapter 2** provides a description of the Geelstert Grid Connection.
- **Chapter 3** provides a description of the identified project alternatives.
- **Chapter 4** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the Geelstert Grid Connection.

[3] These projects comprise the development of two 125MW solar PV facilities and are subject to separate Basic Assessment (BA) processes.

- **Chapter 5** describes the need and desirability of the Geelstert Grid Connection within the grid connection corridor.
- **Chapter 6** outlines the approach to undertaking the BA process.
- **Chapter 7** describes the existing biophysical and socio-economic environment within and surrounding the grid connection corridor for the Geelstert Grid Connection.
- **Chapter 8** provides an assessment of the potential issues and impacts associated with the grid connection corridor proposed and assessed for the Geelstert Grid Connection and presents recommendations for the mitigation of significant impacts.
- **Chapter 9** provides an assessment of the potential for cumulative impacts.
- **Chapter 10** presents the conclusions and recommendations based on the findings of the final BA Report.
- **Chapter 11** provides references used in the compilation of the final BA Report.

1.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This final BA Report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 (as amended) promulgated in terms of Chapter 5 of the National Environmental Management Act (No. 107 of 1998). This Chapter of the final BA Report includes the following information required in terms of Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
3(a) the details of the (i) EAP who prepared the report and (ii) the expertise of the EAP, including a curriculum vitae.	The details of the EAP who prepared the report and the expertise of the EAP is included in Section 1.5. The curriculum vitae of the EAP, project team and independent specialists are included in **Appendix A**.
3(b) the location of the activity including (i) the 21 digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties.	The location of the grid connection corridor is included in Section 1.3, **Table 1.1,** and **Figure 1.1**. The information provided includes the 21-digit Surveyor General codes of the affected properties and the farm names. Additional information is also provided regarding the location of the development which includes the relevant province, local and district municipalities, ward and current land zoning.

1.2. Overview of the Geelstert Grid Connection

ABO Wind renewable energies (Pty) Ltd is proposing the development of a grid connection to connect the Geelstert 1 and Geelstert 2 solar PV facilities[4] in order to add new capacity to the national electricity grid. In order for the Geelstert 1 and Geelstert 2 solar PV facilities to evacuate the generated solar power to the national grid, a grid connection must be established between the solar PV facilities and the Aggeneis MTS, as the Eskom grid connection point in the area. The Geelstert Grid Connection assessed in this report includes the development of all specific and required infrastructure in order to establish the connection between the facilities and the national grid. The infrastructure includes:

[4] The Geelstert 1 and Geelstert 2 solar PV facilities are proposed to be part of the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme.

- A new Geelstert Collector Substation/Switching Station with a development footprint of up to 1.25ha in extent, including:
  - Construction of a new platform with an earth mat and civil works.
  - New feeder bay/s and busbar/s (up to 220kV) complete with protection equipment.
- A double-circuit power line of up to 220kV between the Geelstert Collector Substation and the existing Aggeneis MTS, complete with structures, foundations, conductor, fibre layout, insulation, and assemblies.
- A 6m wide access road to access the Geelstert Collector Substation and 4m wide jeep tracks to provide access to and along the power line servitude.
- A single-circuit power line (of up to 220kV) to connect the authorised Aggeneys 1 and Aggeneys 2 Collector Substations to the proposed Geelstert Collector Substation, including a 6m wide access road along this power line.
- Works within the Aggeneis MTS HV yard:
  - Establish new feeder bay/s (up to 220kV), inclusive of line bays, busbars, bussection and protection equipment.
  - Install a new transformer (up to 500MVA 400/132kV).

Table 1.1 provides an overview of the project details. The key infrastructure components proposed as part of the Geelstert Grid Connection are described in greater detail in Chapter 2 of this final BA Report.

Table 1.1: Details of the grid connection corridor for the Geelstert Grid Connection

Province	Northern Cape
District Municipality	Namakwa
Local Municipality	Khâi-Ma Local
Ward number(s)	4
Nearest town(s)	Aggeneys – 11km Pofadder – 58km
Affected Properties: Farm name(s), number(s) and portion numbers	**Grid Connection Corridor:** » Remaining Extent of the Farm Bloemhoek 61 » Remaining Extent of the Farm Aggeneys 56 » TRemaining Extent of Portion 1 of the Farm Aggeneys 56 » Portion 2 of the Farm Aggeneys 56 » Portion 12 of the Farm Aggeneys 56 » Portion 13 of the Farm Aggeneys 56
SG 21 Digit Code (s)	**Grid Connection Corridor:** » C05300000000006100000 » C05300000000005600000 » C05300000000005600001 » C05300000000005600002 » C05300000000005600012 » C05300000000005700013
Current zoning and land use	Agricultural (with some mining activities taking place within the area (i.e. Black Mountain Mine and Gamsberg Mine))

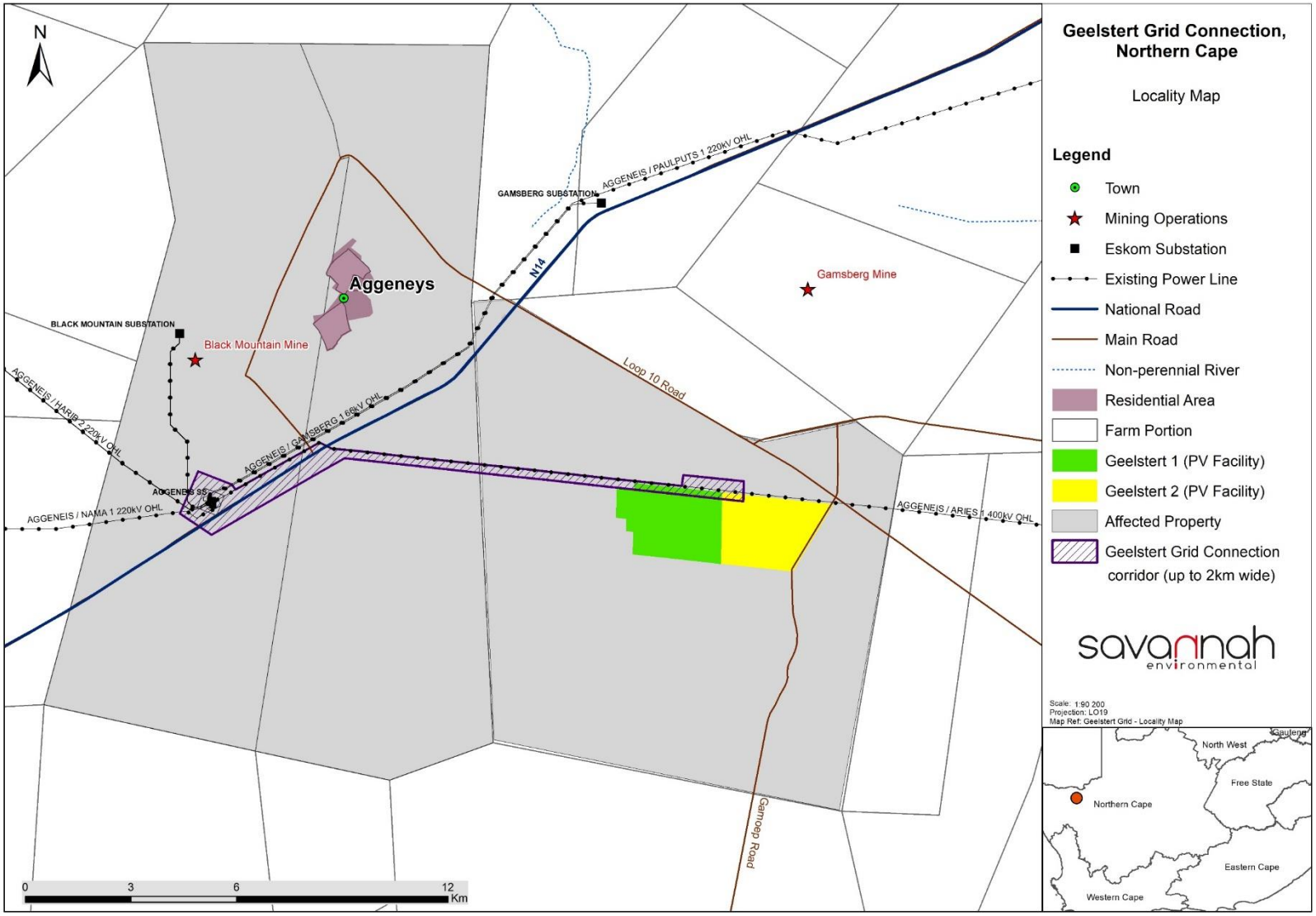

Figure 1.1: Locality map showing the demarcated grid connection corridor for the Geelstert Grid Connection

1.3. Requirements for a Basic Assessment Process

The construction and operation of the Geelstert Grid Connection is subject to the requirements of the EIA Regulations, 2014 (as amended), published in terms of Section 24(5) of the National Environmental Management Act (NEMA) 107 of 1998. The NEMA is the national legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed, and reported on to the Competent Authority (the decision-maker), the Department of Environment, Forestry and Fisheries (DEFF) charged by NEMA and GN R779 of 01 July 2016 with the granting of relevant environmental authorisation for all projects that relate to the Integrated Resources Plan for Electricity (IRP) 2010 – 2030, and any updates thereto. The DEFF will be supported by the Northern Cape Provincial Department of Agriculture, Environmental Affairs, Rural Development and Land Reform as the Commenting Authority.

In terms of the EIA Regulations of 2014 (as amended on 07 April 2017) promulgated under Sections 24 and 24D of the NEMA, various aspects of the project are listed as activities that may have a detrimental impact on the environment. The main listed activity triggered by the development of the Geelstert Grid Connection is Activity 11(i) of Listing Notice 1 (GNR327 of the EIA Regulations, 2014 (as amended)), which relates to the development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts[5]. The application for Environmental Authorisation for the project is, therefore, required to be supported by a Basic Assessment (BA) process.

1.4. Overview of the Basic Assessment Process

A Basic Assessment (BA) is an effective planning and decision-making tool for the project proponent as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be forewarned of potential environmental issues and allows for resolution of the issues reported on in the BA Report as well as dialogue with interested and affected parties (I&APs).

The BA process includes the identification and assessment of environmental impacts though specialist studies, as well as public participation. The process followed in the BA involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative). This includes detailed specialist investigations and a round of public consultation. Following the comment and review period of the BA Report and the Environmental Management Programme[6] (EMPr), a final BA Report and EMPr is submitted to the Competent Authority, which includes the recommendations for practical and achievable mitigation and management measures for final review and decision-making.

The need to comply with the requirements of the EIA Regulations, 2014 (as amended) ensures that the competent authority is provided with the opportunity to consider the potential environmental impacts of a

[5] Refer to Chapter 6 for a full list of Listed Activities applicable to the project.
[6] In accordance with GN R435 of 22 March 2019, Generic EMPrs are required for the Geelstert Collector Substation and the overhead power line.

project early in the project development process and to assess if potential environmental impacts can be avoided, minimised or mitigated to acceptable levels. Environmental issues are considered through specialist assessments in order to: test the environmental suitability of the grid connection corridor for the Geelstert Grid Connection, delineate areas of sensitivity within the grid connection corridor, and ultimately to inform the placement of the grid connection infrastructure within the grid connection corridor. Comprehensive, independent environmental studies are required in accordance with the EIA Regulations, 2014 (as amended) to provide the Competent Authority with sufficient information in order to make an informed decision.

1.5. Objectives of the Basic Assessment Process

Appendix 1 of the EIA Regulations, 2014 (as amended), contains the objectives to be achieved through the undertaking of a BA process. The following objectives have been considered, undertaken and achieved through a consultative process within this final BA Report for the Geelstert Grid Connection:

- The identification and consideration of the policies and legislative context associated with the location of the grid connection infrastructure, and the manner in which the proposed development complies with and responds to the relevant policies and legislative context.
- The identification and consideration of feasible alternatives associated with the grid connection infrastructure for the Geelstert Grid Connection that relate to the specific proposed activity and the location of where the development is proposed.
- The consideration of the need and the desirability of the Geelstert Grid Connection considering the alternatives identified, including the desirability for the development within the grid connection corridor.
- The identification and consideration of the nature, consequence, extent, duration and probability of the impacts associated with the grid connection infrastructure, as well as the degree to which the impacts can be reversed, result in irreplaceable loss of resources and be avoided, managed or mitigated.
- Motivation for the preferred grid connection corridor and the proposed activity.
- Consideration and identification of the environmental sensitivities to provide input in terms of measures to avoid, manage and mitigate the impacts and the residual risks that need to be managed and monitored.

The release of the BA Report for a 30-day review and comment period provided stakeholders with an opportunity to review and provide input in terms of potential issues and concerns that may be associated with the establishment of the grid connection infrastructure. This final BA Report for submission to the DEFF considers and incorporates comments and responses raised during the review and comment period of the BA Report. The DEFF will consider these comments and responses in their decision-making of the application for Environmental Authorisation.

1.6. Details of the Environmental Assessment Practitioner and Expertise to conduct the BA process

In accordance with Regulation 12 of the EIA Regulations, 2014 (GNR 326) ABO Wind renewable energies (Pty) Ltd has appointed Savannah Environmental (Pty) Ltd (Savannah Environmental) as the independent Environmental consultant to undertake the BA and prepare the BA Report for the Geelstert Grid Connection.

Neither Savannah Environmental nor any of the independent specialists are subsidiaries of, or are affiliated to ABO Wind renewable energies (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed Geelstert Grid Connection or its associated infrastructure.

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned) and is rated as a Level 2 Broad-based Black Economic Empowerment (B-BBEE) contributor. The company was established in 2006 with a clear objective to provide services to the infrastructure development sector. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures. The Savannah Environmental team has considerable experience in environmental impact assessments and environmental management and has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa, including those associated with electricity generation and transmission.

The Savannah Environmental team in this project includes:

» **Reuben Maroga** - the principle author of this report. He holds a Bachelor degree in Environmental Management and an Honours degree in Geology and has three years of experience in the environmental management field. His key focus is on undertaking environmental impact assessments, public participation, environmental management plans and programmes.

» **Lisa Opperman** - the co-author of this report. She holds a Bachelor degree with Honours in Environmental Management and has five years of experience in the environmental field. Her key focus is on environmental impact assessments, public participation, environmental management plans and programmes, as well as mapping using ArcGIS for a variety of environmental projects.

» **Jo-Anne Thomas** - is the registered EAP for this project. Jo-Anne holds a Master of Science Degree in Botany (M.S.c Botany) from the University of the Witwatersrand and is registered as an Environmental Assessment Practitioner (2019/726) with the Environmental Assessment Practitioners Association of South Africa (EAPASA), as well as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific Professions (SACNASP). She has over 20 years of experience in the field of environmental assessment and management, and the management of large environmental assessment and management projects. Her responsibilities for environmental studies include project management, review and integration of specialist studies, identification and assessment of potential negative environmental impacts and benefits, and the identification of mitigation measures, and compilation of reports in accordance with applicable environmental legislation.

» **Nicolene Venter** – Board Member of IAPSA (International Association for Public Participation South Africa. She holds a Higher Secretarial Diploma and has over 20 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various

meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

Curricula vitae detailing the Savannah Environmental team's expertise and relevant experience are provided in **Appendix A**.

1.7. Details of the Independent Specialist Team

In order to adequately identify and assess potential impacts associated with the project, a number of specialists have been appointed as part of the project team and have provided specialist input into this final BA Report (refer to **Table 1.2**).

Table 1.2: Specialists which form part of the EIA project team

Company	Specialist Area of Expertise	Specialist Name
3Foxes Biodiversity Consulting	Ecology	Simon Todd
3Foxes Biodiversity Consulting	Avifauna	Eric Hermann
Nkurenkuru Biodiversity	Freshwater	Gerhard Botha
Agriculture Research Council – Soil, Climate and Water	Soils and Agricultural Potential	Garry Paterson
Environmental Planning and Design	Visual	Jon Marshall
CTS Heritage	Heritage	Jenna Lavin
Savannah Environmental	Social	Lisa Opperman with a peer review by Dr Neville Bews of Neville Bews & Associates.

Curricula vitae detailing the specialist team's expertise and relevant experience are provided in **Appendix A**.

CHAPTER 2: PROJECT DESCRIPTION

This chapter provides an overview of the Geelstert Grid Connection and details the project scope, which includes the planning/design, construction, operation and decommissioning activities required for the development.

2.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report.

This chapter of the final BA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(b) the location of the activity including (i) the 21 digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	The location of the Geelstert Grid Connection is detailed in Chapter 1, **Table 1.1**, as well as in Section 2.2.
3(c)(i)(ii) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or on land where the property has not been defined, the coordinates within which the activity is to be undertaken	A layout map illustrating the grid connection corridor within which the Geelstert Grid Connection is proposed is included as **Figure 2.1**.
3(d)(ii) a description of the scope of the proposed activity, including a description of the activities to be undertaken including associated structures and infrastructure	A description of the activities to be undertaken with the development of the Geelstert Grid Connection is included in **Table 2.2**.

2.2. Nature and extent of the Geelstert Grid Connection

The Geelstert Grid Connection including a collector Substation and power lines has been assessed within a grid connection corridor 1km wide (extending to 2km at the Aggeneis Main Transmission Substation (MTS)) and 17.5km in length. The assessment of a corridor allows for the optimisation of the grid connection infrastructure to accommodate and avoid the environmental sensitivities identified through the assessment. The final placement of the grid connection infrastructure will be confirmed when the proposed Geelstert 1 and Geelstert 2 solar PV facilities are awarded Preferred Bidder status by the DMRE. The grid connection corridor traverses six (6) properties, namely:

- Remaining Extent of the Farm Bloemhoek 61
- Remaining Extent of the Farm Aggeneys 56
- Remaining Extent of Portion 1 of the Farm Aggeneys 56
- Portion 2 of the Farm Aggeneys 56
- Portion 12 of the Farm Aggeneys 56
- Portion 13 of the Farm Aggeneys 56

The development of the Geelstert Grid Connection will include the following infrastructure components:

- A new Collector Substation/Switching Station of up to 1.25ha in extent, including:
  - Construction of a new platform with earth mat and civil works.
  - New feeder bay/s and busbar/s (up to 220kV) complete with protection equipment.
- A double-circuit power line of up to 220kV between the Geelstert Collector Substation and the existing Aggeneis MTS, complete with structures, foundations, conductor, fibre layout, insulation, and assemblies.
- A 6m wide access road to access the Geelstert Collector Substation and 4m wide jeep tracks to provide access to and along the power line servitude.
- A single-circuit power line (of up to 220kV) to connect the authorised Aggeneys 1 and Aggeneys 2 Collector Substation to the proposed Geelstert Collector Substation, including a 6m wide access road along this power line.
- Works within the Aggeneis MTS HV yard:
  - Establish new feeder bay/s (up to 220kV), inclusive of line bays, busbars, bussection and protection equipment.
  - Install a new transformer (up to 500MVA 400/132kV).

A summary of the details and dimensions of the planned infrastructure associated with the Geelstert Grid Connection is provided in **Table 2.1** below. **Figure 2.1** shows the location of the collector substation considered for the development of the Geelstert Grid Connection.

Table 2.1: Confirmed details or dimensions of the Geelstert Grid Connection infrastructure components

Infrastructure	Footprint, Dimensions and Details
Corridor width (for assessment purposes)	» 1km wide and extending to 2km at the Aggeneis MTS. Coordinates of the grid connection corridor are included in **Appendix N** of the BA Report.
Power line capacity	» Up to 220kV double-circuit power line to connect the Geelstert Collector Substation and the Aggeneis MTS. » Up to 220kV single-circuit power line to connect the authorised Aggeneys 1 and Aggeneys 2 Collector Substations to the proposed Geelstert Collector Substation.
Power line servitude width	» Up to 47m
Length of the power line	» Up to 17.5km
Height of the towers/pylons	» Up to 40m with an average spacing of 200m.
Geelstert Collector Substation location	» The Geelstert Collector Substation will be located directly north of the on-site facility substations associated with the proposed Geelstert 1 and Geelstert 2 solar PV facilities. »
Geelstert Collector substation capacity	» Up to 220kV
Geelstert Substation footprint	» 1.25ha in extent
Access roads/ tracks	» 6m wide access road to access the Geelstert Collector Substation and 4m wide jeep tracks to provide access to the power line servitude. »
Other infrastructure	» Works within the Aggeneis MTS HV yard:

	o New feeder bay/s (up to 220kV), inclusive of line bays, busbars, bussection and protection equipment. o New transformer (of up to 500MVA, 400/132kV)

In the event that the authorised Aggeneys 1 and Aggeneys 2 solar PV facilities and the proposed Geelstert 1 and Geelstert 2 solar PV facilities are awarded Preferred Bidder status, Eskom (the owner of the grid connection infrastructure) would request that one overhead power line be constructed to connect all four solar PV facilities to the Aggeneis MTS. Should this be the case, the proposed single-circuit power line of up to 220kV running from the Aggeneys 1 and Aggeneys 2 collector substations and the double-circuit power line of up to 220kV to connect the Geelstert Collector Substation to the Aggeneis MTS will be constructed.

Table 2.2 below provides details regarding the requirements and activities to be undertaken during the Geelstert Grid Connection development phases.

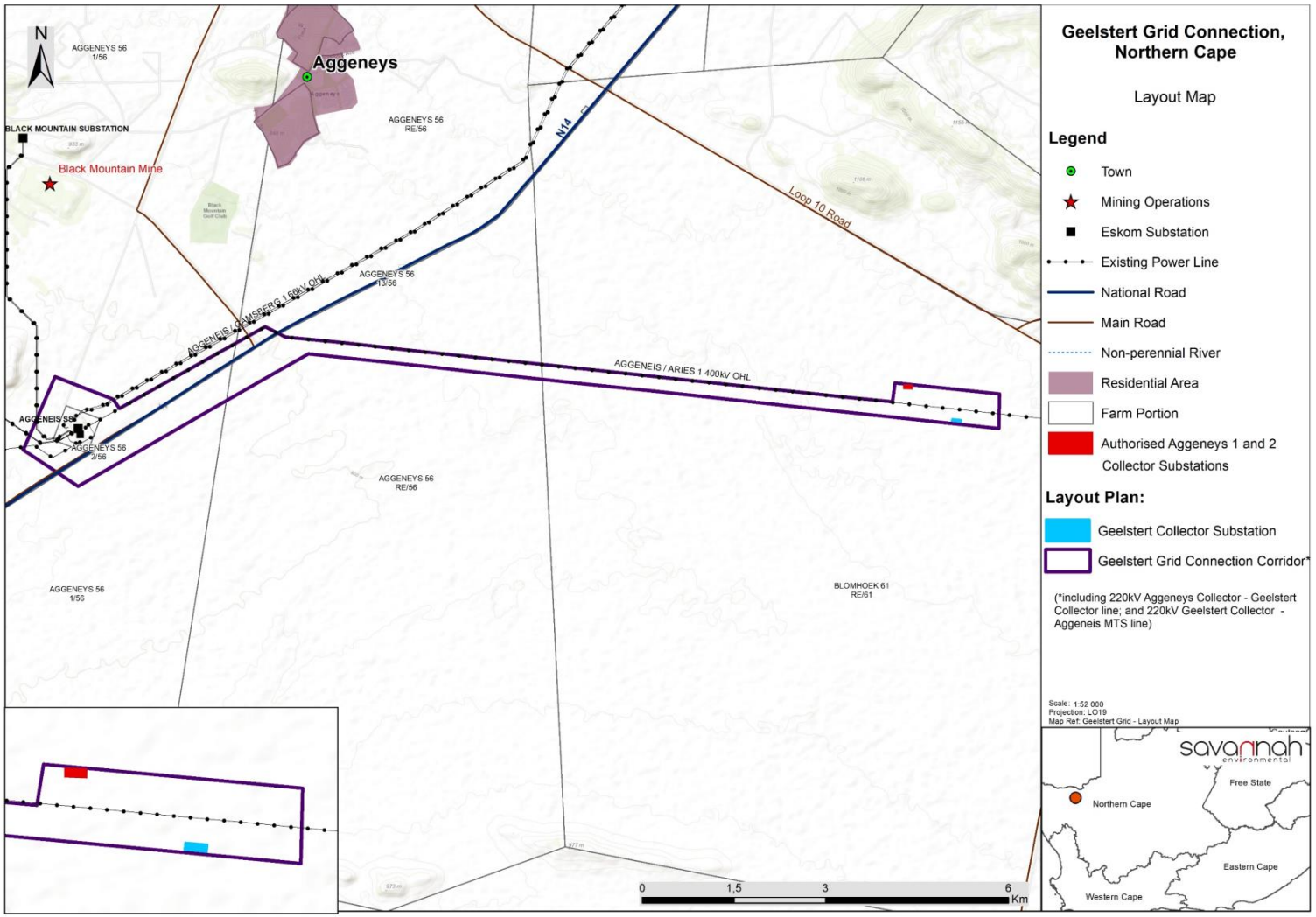

Figure 2.1: Layout map showing the location of the Proposed Geelstert Collector Substation and the Authorised Aggeneys 1 and 2 Collector Substation within the 1km wide grid connection corridor extending to Aggeneis MTS.

2.2.1 Project Development Phases associated with the Geelstert Grid Connection

Table 2.2: Details of the Geelstert Grid Connection development phases (i.e. construction, operation and decommissioning)

Construction Phase	
» Duration of the construction phase is expected to be up to 12 months. » Create direct construction employment opportunities. Up to 130 employment opportunities will be created during the construction phase. » No on-site labour camps. Employees to be accommodated in nearby towns such as Aggeneys, and transported to and from site on a daily basis. » Overnight on-site worker presence would be limited to security staff. » Construction waste will be stored on site and waste removal and sanitation will be undertaken by a sub-contractor or the municipality. » Negligible water will be required for the construction phase and potable needs. If required, water will be sourced from the municipality or private sources.	
Construction sequence	Overhead power lines are constructed in the following simplified sequence: » Step 1: Surveying of the power line servitude and negotiating with affected landowners; » Step 2: Final design and micro-siting of the infrastructure based on geo-technical, topographical conditions and potential environmental sensitivities and obtain required environmental permits (such as biodiversity permits, heritage permits & WUL/GA); » Step 3: Vegetation clearance and construction of access roads/tracks (where required); » Step 4: Construction of tower foundations; » Step 5: Assembly and erection of infrastructure on site; » Step 6: Stringing of conductors; » Step 7: Rehabilitation of disturbed areas; » Step 8: Continued maintenance. The final definition of the centre line for the power line and co-ordinates of each bend in the line (if applicable) will be determined on receipt of an environmental authorisation of the assessed corridor by the competent authority and after negotiations with landowners and final environmental and technical surveys[7]. Collector Substation is constructed in the following simplified sequence:

[7] The start, middle and end coordinates of the grid connection corridor is included in **Appendix N**.

	» Step 1: Conduct geotechnical investigations to determine founding conditions; » Step 2: Conduct site survey; » Step 3: Vegetation clearance and construction of access road; » Step 4: Site grading and levelling; » Step 5: Construction of foundations; » Step 6: Import of collector substation components; » Step 7: Construction of collector substation; » Step 8: Rehabilitation of disturbed area and protection of erosion sensitive areas; and » Step 9: Testing and commissioning. The footprint of the Geelstert Collector Substation may include buildings required for operation.
Activities to be undertaken	
Conduct surveys prior to construction	» Including, but not limited to: a geotechnical survey, site survey (including the location of the collector substation and each power line tower position) and confirmation of the power line servitude, and all other associated infrastructure.
Establishment of access roads	» Access roads/tracks to be established within the servitude (underneath or adjacent to the final confirmed power line route) for construction and/or maintenance activities required. » Access roads/tracks will be established as construction commences at the various locations within the servitude. » Existing access roads will be utilised where possible to minimise impact, and upgraded where required. » New access roads will be up to 6m in width for access to the collector substation, and jeep tracks, to provide access to the power line will be 4m wide.
Undertake site preparation	» Including the clearance of vegetation at the collector substation, power line tower positions, the establishment of access roads/tracks and excavations for foundations. » Stripping of topsoil at the collector substation, tower footprint areas and along access roads to be stockpiled, backfilled, removed from site and/or spread on site. » To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected to erosion. » Include search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required) along the final power line route and within the collector substation footprint.
Establishment of laydown areas and batching plant on site	» A laydown area for the storage of the grid infrastructure components, including the civil engineering construction equipment. » The laydown area will also accommodate building materials and equipment associated with the construction of buildings. » No borrow pits will be required. Infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas. » A temporary concrete batching plant of 50m x 50m in extent to facilitate the concrete requirements for grid infrastructure foundations. Other options include the use of mobile batching plants that allow for *in situ* batching of concrete.

Undertake site rehabilitation	» Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. » On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.
Operation Phase	
» Duration will be ~20 years, or longer as needed for the operation of the PV facilities. » Requirements for security and maintenance of the grid connection infrastructure. » Employment opportunities relating mainly to operation activities and maintenance. Very limited employment opportunities will be available[8]. » Current land-use activities, i.e. grazing, can continue in the areas adjacent to the infrastructure.	
Activities to be undertaken	
Operation and Maintenance	» Part-time security and maintenance staff, especially for the collector substation. » Disposal of waste products (e.g. oil) in accordance with relevant waste management legislation. » On-going rehabilitation of those areas which were disturbed during the construction phase. » During this operation phase vegetation within the power line servitude (up to 47m), and around the collector substation will require management only if it impacts on the safety and operational objectives of the project. » The maintenance of the grid connection infrastructure will be the responsibility of the holder of the Environmental Authorisation.
Decommissioning Phase	
Requirements	» Decommissioning of the grid connection infrastructure at the end of its economic life. » Expected lifespan of approximately 20 years (with maintenance) before decommissioning is required. » Decommissioning activities to comply with the legislation relevant at the time.
Activities to be undertaken	
Site preparation	» Confirming the integrity of access to the grid connection infrastructure to accommodate the required equipment. » Mobilisation of decommissioning equipment.
Disassemble components and rehabilitation	» The grid connection infrastructure components will be disassembled, and reused and recycled (where possible). » Where components cannot be reused or recycled these will be disposed of in accordance with the regulatory requirements at the time

[8] It must be noted that ownership of the Geelstert Collector Substation and power line will be transferred to Eskom following the completion of construction. The operation and maintenance of the power line and the Geelstert Collector Substation will be undertaken by Eskom.

	of decommissioning. » Disturbed areas, where infrastructure has been removed, will be rehabilitated, if required and depending on the future land-use of the affected areas and the relevant legislation applicable at the time of decommissioning.

It is expected that the areas affected by the development of the Geelstert Grid Connection and associated infrastructure will revert to its original land-use (i.e. primarily sheep farming and grazing) once the solar PV facilities have reached the end of their economic lives and all infrastructure has been decommissioned. Sheep farming and grazing will continue along the power line route during the operation phase of the Geelstert Grid Connection.

CHAPTER 3: ALTERNATIVES

This Chapter provides an overview of the various alternatives considered for the Geelstert Grid Connection as part of the BA Process.

3.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This Chapter of the final BA Report includes the following information required in terms of Appendix 1:

Requirement	Relevant Section
(g) a motivation for the preferred site, activity and technology alternative;	A motivation for the preferred grid connection corridor, activity and technology alternative is included in sections 3.1.2.1 – 3.1.2.3.
(h)(i) details of all the alternatives considered;	The details of all alternatives considered are included in section 3.1.2.
(h)(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such.	A motivation for not considering any alternative development locations (i.e. alternative grid connection corridor) is included in section 3.1.2.

3.2. Alternatives Considered during the BA Process

Appendix 1 of the EIA Regulations, 2014 (as amended), state that a BA Report must contain a motivation for the preferred site (i.e. grid connection corridor), activity and technology alternatives. Alternatives are required to be assessed in terms of social, biophysical, economic and technical factors.

The DEFF Guideline for determining alternatives states that the key criteria for consideration when identifying alternatives are that they should be "practicable", "feasible", "relevant", "reasonable" and "viable". Essentially there are two types of alternatives:

» Incrementally different (modifications) alternatives to the project.
» Fundamentally (totally) different alternatives to the project.

In this instance, 'the project' refers to the construction and operation of a grid connection for the proposed Geelstert 1 and Geelstert 2 solar PV facilities located south-east of Aggeneys in the Northern Cape Province. The project is known as the Geelstert Grid Connection and will include the development of a collector substation and double-circuit power line (of up to 220kV) to connect the proposed Geelstert 1 and Geelstert 2 solar PV facilities to the Aggeneis MTS. The Aggeneis MTS is located 14km west of the solar PV facilities. The solar PV facilities including the grid connection will be developed by an Independent Power Producer (IPP) to form part of the DMRE's REIPPP Programme.

3.1.1. Consideration of Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level through the consideration of national, provincial and local policy and, as a result, project-specific EIAs are limited in scope and ability to address fundamentally different alternatives. As no technological alternatives exist for the distribution of

electricity, no fundamentally different technology alternatives can be considered for the proposed Geelstert Grid Connection.

3.1.2. Consideration of Incrementally Different Alternatives

Incrementally different alternatives relate specifically to the project under investigation. "Alternatives", in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include alternatives for:

- The location where the activity is proposed to be undertaken.
- The type of activity to be undertaken.
- The design or layout of the activity.
- The technology to be used in the activity.
- The operational aspects of the activity.

In addition, the option of not implementing the activity (i.e. the "do-nothing" alternative) must also be considered. These alternatives are discussed under the respective sub-headings below.

The consideration of a broader grid connection corridor enables the avoidance of environmental sensitivities, thereby ensuring that the Geelstert Grid Connection infrastructure can be placed appropriately without resulting in an unacceptable environmental impact. As a result, no grid connection corridor alternatives have been proposed for the development of the Geelstert Grid Connection, therefore the identified grid connection corridor is considered to be suitable for the development of the required grid connection infrastructure, taking into consideration the identified environmental sensitive features and areas. As a result, no alternative grid connection corridors have been assessed within this final BA Report.

3.1.2.1. Design and Layout Alternatives

The design of the collector substation, power lines and other associated infrastructure (including works within the High Voltage (HV) yard of the Aggeneis MTS) is required to conform to Eskom's technical standards as it forms part of the national electricity supply network and must fit in seamlessly with the existing network systems, technology and infrastructure. The Geelstert Grid Connection includes a collector substation and power lines to be located within a grid connection corridor 1km wide (extending to 2km at the Aggeneis Main Transmission Substation (MTS)) and 17.5km in length. The assessment of a grid connection corridor (i.e. a wider area than the required servitude within which the infrastructure will be placed) within the BA process allows for the avoidance and optimisation of identified environmental sensitivities through the appropriate placement of the grid connection infrastructure footprint and the servitude within the preferred grid connection corridor.

The grid connection corridor is located within the Springbok REDZ and the Northern Strategic Transmission Corridor, areas earmarked for the development of large-scale renewable energy facilities and grid connection infrastructure. As a result, the grid connection corridor of the Geelstert Grid Connection has been appropriately placed within the area.

3.1.2.2. Location Alternatives

Taking into consideration that the surrounding area within which the Geelstert Grid Connection is proposed is associated with numerous proposed and authorised renewable energy facilities and associated grid connection infrastructure, the placement of the collector substation and the power lines for the Geelstert Grid Connection is dependent on several factors which include, the presence of sensitive environmental features (i.e. wetlands, drainage lines and habitats, etc.) and topography. The need and desirability of the Geelstert Grid Connection is discussed in detail in **Chapter 5** of the final BA Report.

ABO Wind renewable energies (Pty) Ltd as the proponent for the Geelstert Grid Connection, considers the preferred grid connection corridor as highly suitable for development as it Is located adjacent to other linear infrastructure such as the existing Aries/Aggeneis 400kV Power Line; the N14 and other power lines in the area that connect to the Aggeneis MTS. As a result, this affords the opportunity for linear infrastructure to be consolidated to one area within the surrounding landscape and this may lessen negative environmental and social impacts associated with the development of the grid connection infrastructure. In addition, the grid connection corridor was informed by the closest and most feasible grid connection point into the national grid; consultation with Eskom network planners and the consideration of the routing of other similar infrastructure in the area. Through this process, a grid connection corridor for the Geelstert Grid Connection was identified and includes project-specific infrastructure to connect the proposed Geelstert 1 and Geelstert 2 solar PV facilities to the national grid.

The specific characteristics considered, and the results thereof, are discussed in the sections below. The proponent considered that should these characteristics not be available or favourable for the development of the Geelstert Grid Connection, then some limitations and challenges may be expected.

- **Land Availability and Land Use** – In order to develop the Geelstert Grid Connection, sufficient space, and access to land between the solar PV facilities and the Aggeneis MTS (and along the identified grid connection corridor) is required. The land use within the grid connection corridor is mainly agriculture and mining. Agricultural activities are limited to grazing with no cultivation present as a result of the poor rainfall associated with the Aggeneys area. Mining activities within the vicinity of the grid connection corridor include, the Black Mountain and Gamsberg mines located to the north-west and north of the grid connection corridor. The grid connection corridor does not infringe on sections of land currently being used for mining or agriculture, therefore there is no conflict to the land uses in the area.

- **Access to the National Grid –** The proponent has consulted with Eskom regarding the grid connection options in the area for the proposed solar PV facilities. All options considered are a direct overhead power line to the Aggeneis MTS, with a capacity of up to 220kV.

- **Geographical and topographical considerations** – The terrain traversed by the identified grid connection corridor is fairly flat, providing good conditions for power line construction.
-

- **Consideration of sensitive environmental features** – Through the assessment of the grid connection corridor, which is much larger than the area required for the servitude of ~47m, an opportunity is created by the proponent for the avoidance of sensitive environmental features and areas. The consideration of a broader grid connection corridor enables the avoidance of environmental

sensitivities, thereby ensuring that the Geelstert Grid Connection infrastructure can be placed appropriately without resulting in an unacceptable environmental impact. This consideration is in line with the mitigation strategy and enables the achievement of the objectives of the mitigation hierarchy (i.e. avoid, minimise, mitigate). This application of the mitigation strategy will result in the identification of the optimised placement of the grid connection infrastructure within the grid connection corridor.

»

The Geelstert Grid Connection infrastructure will be developed within a servitude to be negotiated with landowners within the grid connection corridor.

Considering the above characteristics associated with the grid connection corridor, no location alternatives are considered for the Geelstert Grid Connection.

3.1.2.3. Technology Alternatives

No technology alternatives exist for the distribution of electricity. Therefore, no technology alternatives are being assessed as part of this BA process.

3.1.3 The 'do-nothing' Alternative

The 'do-nothing' alternative is the option of not constructing the Geelstert Grid Connection. Should this alternative be selected, there would be no environmental impacts or benefits as a result of construction and operation activities associated with the Geelstert Grid Connection, however the proposed Geelstert 1 and Geelstert 2 solar PV facilities will not be able to evacuate the generated power into the national grid, which will hinder the operation of the facilities. The 'do-nothing' alternative has been assessed as part of the BA process (refer to **Chapter 10** of this final BA Report).

CHAPTER 4: REGULATORY AND PLANNING CONTEXT

This Chapter provides an overview of the policy and legislative context within which the development of the Geelstert Grid Connection is proposed. It identifies environmental legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process which may be applicable to or have bearing on the proposed project.

4.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the final BA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(e)(i) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report	Chapter 4 as a whole provides an overview of the policy and legislative context which is considered to be associated and relevant to the development of the grid connection infrastructure. The regulatory and planning context has been considered at international, national, provincial and local level.
3(e)(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools, frameworks and instruments.	**Tables 4.1**, **4.2**, **4.3** and **4.4** illustrate the compliance of the proposed Geelstert Grid Connection with the legislation, policies, plans, guidelines, tools, frameworks and instruments.

4.2. Strategic Electricity Planning in South Africa

The regulatory hierarchy of policy and planning documentation that support the development of the Geelstert Grid Connection consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of the grid connection infrastructure.

At **National Level**, the main regulatory agencies are:

» **Department of Environment, Forestry and Fisheries (DEFF):** DEFF is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations, 2014 (GNR 326). As per GNR 779 of 01 July 2016, DEFF is the Competent Authority, and is charged with making a decision regarding the granting of the relevant EA for this project.

- **South African Heritage Resources Agency (SAHRA)**: SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- **Department of Water and Sanitation[9] (DWS):** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. DWS is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WULs) and/or registration of General Authorisations (GAs)).
- **Department of Agriculture, Forestry and Fisheries[10] (DAFF)**: DAFF is the custodian of South Africa's agricultural, forestry, and fishery resources and is primarily responsible for the formulation and implementation of policies governing the Agriculture, Forestry and Fisheries Sector. DAFF is also responsible for the issuing of permits for the disturbance or destruction of protected tree species listed under Section 15(1) of the National Forest Act (No. 84 of 1998) (NFA).
- **Department of Mineral Resources and Energy (DMRE)**: Approval from DMRE will be required to use land surface contrary to the objects of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA) in terms of Section 53 of the Act. In terms of the MPRDA approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that may occur within the grid connection corridor considered for the development of the Geelstert Grid Connection.
- **Department of Rural Development and Land Reform (DRDLR):** DRDLR is dedicated to the social and economic development of rural South Africa and is responsible for providing a framework for rural development.
- **South African National Roads Agency Limited (SANRAL):** SANRAL is responsible for the regulation and maintenance of all national roads and routes.

At **Provincial Level**, the main regulatory agencies are:

- **Provincial Government of the Northern Cape - Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD&LR):** This Department is the commenting authority for the BA process and is responsible for issuing of biodiversity and conservation-related permits.
- **Northern Cape Department of Roads and Public Works (NCDRPW):** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.
- **Ngwao Boswa Kapa Bokone (NBKB):** This Department identifies, conserves and manages heritage resources throughout the Northern Cape Province.

At the **Local Level,** the local and district municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape Province, both the local and district municipalities play a role. The local municipality is the Khâi-Ma Local Municipality which forms

[9] The Department of Water and Sanitation (DWS) is soon to be known as the Department of Human Settlements, Water and Sanitation (DHWS).

[10] The Department of Agriculture, Forestry and Fisheries (DAFF) is soon to be known as the Department of Agriculture, Rural Development and Land Reform.

part of the Namakwa District Municipality. In terms of the Municipal Systems Act (No. 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

The Geelstert Grid Connection is regarded as essential infrastructure for the evacuation of electricity from the proposed Geelstert 1 and Geelstert 2 solar PV facilities to the national grid (through the Aggeneis MTS); therefore, the legislation, policies and plans from a national, provincial and local level that are relevant for the development of the solar PV facilities (including renewable energy) are relevant for the development of the grid connection infrastructure.

4.3. Policy and Planning Considerations at National, Provincial and Local Levels

4.3.1. Policy and Planning at a National Level

National policies and plans adopted by South Africa that are considered to be relevant to the development of the Geelstert Grid Connection have been summarised in **Table 4.1**.

Table 4.1: National policies, plans and legislation relevant for the Geelstert Grid Connection

Policy, Plan or Legislation	Is the development of the Geelstert Grid Connection aligned with this policy, plan or legislation?
The National Energy Act (2008)	Yes. One of the objectives of the Act is to promote the diversity of the supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources and states that provision must be made for increased generation and consumption of renewable energies. The development of the Geelstert Grid Connection for the proposed Geelstert 1 and Geelstert 2 solar PV facilities, enables the evacuation of renewable power into the national grid and thereby promotes diversity of supply of energy and the source of supply, in line with the Act's objectives.
White Paper on the Energy Policy of South Africa, 1998	Yes. The South African Energy Policy of 1998 identifies five key objectives, namely increasing access to affordable energy services, improving energy sector governance, stimulating economic development, managing energy related environmental impacts and securing supply through diversity. In order to meet these objectives South Africa needs to optimally use available energy resources. The development of the Geelstert Grid Connection will enable the contribution, albeit only to a limited extent, to the achievement of the five objectives of the Energy Policy of the country.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	Yes. This White Paper fosters the uptake of renewable energy in the economy and has a number of objectives that need to be met, including that equitable resources are invested in renewable technologies. South Africa is also endowed with renewable energy resources that can be sustainable alternatives to fossil fuels. The development of additional renewable energy projects (i.e. the Geelstert 1 and Geelstert 2 solar PV facilities and the Geelstert Grid Connection) will promote the use of the abundant South African renewable energy resources and contribute to long-term energy security and diversification of the energy mix. The development of the Geelstert Grid Connection enables the evacuation of the generated power into the national grid and thereby enables the use of renewable energy technologies for the country.
The Electricity Regulation Act, 2006 (Act No. 4 of 2006), as amended	Yes. The Act establishes a national regulatory framework for the electricity supply industry of the country and introduces the National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated. The proponent of the Geelstert Grid Connection will have to ensure compliance with this Act for the distribution

Policy, Plan or Legislation	Is the development of the Geelstert Grid Connection aligned with this policy, plan or legislation?
	of the generated power into the national grid.
Renewable Energy Policy in South Africa	Yes. Support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable energy resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. However, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been largely neglected in South Africa. Challenges regarding the implementation of renewable energy have been identified. Through the development of renewable energy projects such as the Geelstert 1 and Geelstert 2 solar PV facilities and the associated proposed Geelstert Grid Connection, additional renewable energy will be made available which will assist with the further growth and development of the renewable energy sector.
National Development Plan (NDP)	Yes. The NDP aims at eliminating poverty and reducing inequality by 2030 and identifies 9 key challenges and associated remedial plans. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy. The plan also sets out steps that aim to ensure that, in 20 years, South Africa's energy system looks very different to the current situation: coal will contribute proportionately less to the primary-energy needs, while gas and renewable energy resources – especially wind, solar and imported hydroelectricity – will play a much larger role. Through the development of renewable energy projects such as the Geelstert 1 and Geelstert 2 solar PV facilities and the associated proposed Geelstert Grid Connection, additional renewable energy will be available which will assist in expanding the renewable energy sector of the country and add to the diversification of the energy mix, which is moving away from coal and towards the use of gas and renewable energy.
Integrated Energy Plan (IEP)	Yes. The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. Eight key objectives were identified which relate mainly to the security, cost, access, diversity, efficiency, impact in terms of emissions, conservation and social benefits in terms of energy planning. The IEP recognises the potential of renewable energy for power generation. With the additional renewable energy to be generated by the Geelstert 1 and Geelstert 2 solar PV facilities, and to be evacuated to the national grid via the proposed Geelstert Grid Connection, a contribution to this objective will be made. Also, with the development of the Geelstert 1 and Geelstert 2 solar PV facilities and the Geelstert Grid Connection, the eight key objectives in terms of energy planning will be met, even if only to a limited extent.
Integrated Resource Plan (IRP) 2010 - 2030	Yes. The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 constitutes a subset of the IEP and is South Africa's national electricity plan. The document outlines the proposed generation new-build fleet for South Africa. The adopted scenario was derived based on a cost-optimal solution for new-build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation. The IRP essentially drives the assortment of energy to be implemented for South Africa which is known as the energy mix of the country, considering various generation technologies. On 27 August 2018, the then Minister of Energy published a draft IRP which was issued for public comment. The lengthy public participation and consultation process has culminated in the issue of the IRP 2019 which updates the energy forecast from the

Policy, Plan or Legislation	Is the development of the Geelstert Grid Connection aligned with this policy, plan or legislation?
	current period to the year 2030. Since the promulgated IRP 2010, the following capacity developments have taken place: » A total of 6 422MW has been procured thus far under the REIPPP Programme, with 3 876MW being currently operational and made available to the grid. In addition, IPPs have commissioned 1005MW from two (2) Open Cycle Gas Turbines (OCGT) peaking plants; and » Under the Eskom Build Programme, 1 332MW has been procured from the Ingula Pumped Storage Project, 1 588MW and 800MW from the Medupi and Kusile power stations and 100MW from the Sere Wind Farm. Provision has been made for the following new capacity by 2030: » 1 500MW of coal; » 2 500MW of hydro; » 6 000MW of solar PV; » 14 400MW of wind; » 1 860MW of nuclear; » 2 088MW of storage; » 3 000MW of gas/diesel; and » 4 000MW from other distributed generation, co-generation, biomass and landfill technologies. Based on the IRP 2019, 1 474MW has been installed for solar PV facilities, whereas, 814MW has already been procured. In addition, 6 000MW has been allocated for solar PV facilities for the period up to 2030. The development of the Geelstert Grid Connection for the Geelstert 1 and Geelstert 2 solar PV facilities, each with the potential to generate 125MW$_{AC}$ of solar energy into the national grid will support the Government's target for electricity generated by solar PV facilities.
Strategic Integrated Projects (SIP)	Yes. In 2010, a National Development Plan was drafted to address socio-economic issues affecting development in South Africa. These issues were identified and placed under 18 different Strategic Integrated Projects (SIPs) to address the spatial imbalances of the past by addressing the needs of the poorer provinces and enabling socio-economic development. The development the Geelstert Grid Connection will support the Strategic Integrated Projects within one SIP, which relates to the development of the associated grid connection infrastructure. This is known as SIP 10 – electricity transmission and distribution for all. In support of SIP 10, the Department of Environmental Affairs undertook a Strategic Environmental Assessment (SEA) which aims to provide guidance for the efficient and sustainable expansion of strategic electricity grid infrastructure in South Africa. This SEA identified the optimal location for strategic corridors where transmission infrastructure expansion is needed to enable the balancing of future demand and supply requirements, while minimising negative impacts to the environment. These areas are referred to as Transmission Corridors, and were gazetted within GNR113 of February 2018. The Geelstert Grid Connection corridor is located within the Northern Transmission Corridor and is therefore considered to be in line with national planning in this regard.
New Growth Path (NGP) Framework, 2010	Yes. The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020.

Policy, Plan or Legislation	Is the development of the Geelstert Grid Connection aligned with this policy, plan or legislation?
	With economic growth and employment creation as the key indicators identified in the NGP. To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas. The Geelstert 1 and Geelstert 2 solar PV facilities, as well as the proposed Geelstert Grid Connection, will assist with the creation of both temporary and permanent employment opportunities during the construction and operation phases, which will contribute, albeit to a limited extent, to the economy and sustainable growth.
National Climate Change Response Strategy	Yes. This strategy aims to address issues identified as priorities for dealing with climate change in the country. The focus of the strategy is adapting to climate change; developing a sustainable energy programme; adopting an integrated response by the relevant government departments; compiling inventories of greenhouse gases; accessing and managing financial resources; and research, education, and training. The development of the Geelstert Grid Connection will enable additional uptake of renewable energy into the national grid which will reduce the need for the use of coal as an energy resource and thereby assist in addressing climate change and global warming.
Climate Change Bill, 2018	Yes, with limited relevance. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The bill aims to provide for the coordinated and integrated response to climate change and its impacts, provide effective management of inevitable climate change impacts and to make a fair contribution to the global effort to stabilise greenhouse gas concentrations. The Geelstert Grid Connection relates to the evacuation of renewable energy into the national grid, and would therefore not result in the generation or release of emissions during its operation.

4.3.2. Policy and Planning at a Provincial Level

Policies and plans have been adopted by the Northern Cape Province for the management of the area and are considered to be relevant to the development of the Geelstert Grid Connection. **Table 4.2** provides a summary of the relevant provincial plans and policies.

Table 4.2: Provincial policies and plans relevant to the Geelstert Grid Connection

Policy or Plan	Is the development of the Geelstert Grid Connectionaligned with this policy or plan?
Northern Cape Provincial Spatial Development Framework (PSDF), 2012	Yes. The PSDF seeks to advance the establishment of renewable energy supply schemes within the Province and identifies that the Northern Cape holds a potential comparative advantage due to the high solar irradiance which could be a source of renewable energy, specifically for sustainable electricity production. The PSDF also aims for renewable energy sources to constitute 25% of the Province's energy production capacity by 2020. The REIPPPP focus on Northern Cape Provincial Report Volume 1 (June 2017) indicates that the Northern Cape Province has contributed 16 991GWh actual energy to the national grid which amounts to approximately 42% of the renewable energy contribution to the grid. Of this 42%, 13% (i.e. 958 GWh) was generated by wind energy facilities and 73% (i.e. 5 218 GWh) was generated by solar energy facilities. With the developed and proposed independent power producer capacity (including the Geelstert 1 and Geelstert 2 solar PV facilities as well as the Geelstert Grid Connection), the Province will produce more than 100% of its own electrical power needs from renewable energy resources (although this energy will be fed into the national grid).

Northern Cape Reviewed Spatial Development Framework (PSDF) Executive Summary 2018	As part of land use management, the PSDF identifies spatial planning categories for the province which includes: a) Core Conservation Areas; b) Natural Buffer Areas; c) Agricultural Areas; d) Urban Related Areas; e) Industrial Areas; and f) Surface Infrastructure. These categories provide a framework to guide decision-making regarding land-use at all levels of planning which provides an organised process enabling sustainable development in a coherent manner. Renewable energy has been included under category f – Surface Infrastructure. One of the key strategies and interventions as part of this planning category is the conducting of Strategic Environmental Assessments in areas suited for renewable energy generation to incentivise and streamline the administrative and development processes. High impact projects have been identified for the province which includes a renewable energy and gas energy business incubator, a renewable energy and gas energy skills development centre and supply chain centres in each REDZ, namely the Upington REDZ, Springbok REDZ and Kimberley REDZ. The development of the Geelstert Grid Connection is required in order to connect the Geelstert 1 and Geelstert 2 solar PV facilities to the national grid and evacuate up to 250MW$_{AC}$ of electricity into the national electricity grid.

4.3.3. Policy and Planning on a District and Local Level

Strategic policies at the district and local level have similar objectives for the respective areas, namely the delivery of basic services, including the provision of electricity. The development of the proposed grid connection infrastructure is considered to align with the aims of these policies.

Table 4.3 provides a summary of the district and local level policies and plans considered to be relevant to the development of the Geelstert Grid Connection.

Table 4.3: District and local policies and plans relevant to the Geelstert Grid Connection

Policy or Plan	Is the development of the Geelstert Grid Connection aligned with this policy or plan?
Namakwa District Municipality Rural Development Plan (RDP), 2017 – 2022	Yes. Renewable energy developments are considered to be development priorities within the RDP. The need to evaluate localisation possibilities for all renewable energy technologies is emphasised in the Plan. The development of renewable energy projects (including the proposed Geelstert Grid Connection) will contribute to the achievement of the need for the development of renewable energy developments within the Province.
Namakwa District Municipality Integrated Development Plan (IDP), 2017 - 2022	Yes. The plan identifies the need for support to the local municipalities to deliver basic services such as water, sanitation, housing, electricity and waste management. The IDP also seeks to establish good governance by enforcing the climate change response plan. The development of the Geelstert Grid Connection may contribute to the delivery of basic services, however only to a limited extent. The proposed Geelstert 1 and Geelstert 2 solar PV facilities and the Geelstert Grid Connection will contribute to the application of the climate change response plan, through zero production of greenhouse gas emissions during the operation of the facilities and associated grid.

Khâi-Ma Local Municipality Integrated Development Plan (2017/18 – 2021/22)	The Vision set for the Khâi-Ma Local Municipality is "Creating an economically viable and fully developed municipality, which enhances the standard of living of all the inhabitants/ community members of the Khâi-Ma Local Municipality through good governance, excellent service delivery and sustainable development. Simply put, the vision is "Improved and sustainable standard of living for all". Linked to the Vision is the Mission statement, which is the "Provision of transparent, accountable and sustainable service delivery". The IDP identifies a number of Key Performance Areas (KPAs) identified by communities during Phase 1 of the IDP Process. The KPAs that are relevant to the proposed project include: KPA 1: Service Delivery and Infrastructure Development; and KPA 2: Local Economic Development. The priority issues identified in the IDP that are relevant to the project and are linked to the KPAs include lack of Basic Services (KPA 1); Poverty and Unemployment (KPA 2); Lack of sport and recreational facilities and services (KPA 1); and Lack of sufficient and proper health services (HIV/AIDS) (KPA 1). Some of the key social challenges identified by the community during the IDP process include increase in drug abuse, increase in young children (under 10 years) actively abusing alcohol, increase in teenage pregnancies, increase in crime linked to alcohol and drug abuse, high levels of youth unemployment, and increase in the prevalence of HIV & Aids The renewable energy sector is also recognised as a key sector. The IDP notes that a number of new opportunities have opened up for the Namakwa area since the need to facilitate the generation of sustainable energy was introduced in South Africa by Eskom and the South African government. The IDP notes that there are a number of solar projects proposed in the area and that the economic benefits from these projects are eagerly anticipated.

CHAPTER 5: NEED AND DESIRABILITY

Appendix 1 of the EIA Regulations, 2014 (as amended) requires the inclusion of a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location. This Chapter provides an overview of the anticipated suitability of the Geelstert Grid Connection being developed for the proposed Geelstert 1 and Geelstert 2 solar PV facilities from a national, regional and site-specific perspective. It provides an overview of the need and desirability, and perceived benefits of the project at the preferred location.

5.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the final BA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location.	The need and desirability of the Geelstert Grid Connection is described within this chapter as a whole.

5.2. Need and Desirability of the Geelstert Grid Connection

The Geelstert Grid Connection will facilitate the transmission of the electricity generated by the proposed Geelstert 1 and Geelstert 2 solar PV facilities into the national grid and is considered essential infrastructure for the operation of the solar PV facilities. Therefore, the need for the Geelstert Grid Connection is directly linked to the need and desirability of the proposed Geelstert 1 and Geelstert 2 solar PV facilities, which are aligned with national and regional policies and plans. This can be summarised as follows[11]:

- The need for the country to respond to the international commitments regarding climate change and reduction in carbon emissions.
- The need at a national level to diversify the power generation technology mix to include up to 17.8GW of renewables, as defined in the Integrated Resource Plan (IRP), 2019 (as discussed in detail in **Chapter 4**).
- The need to align development with the requirements of the National Development Plan in order to address the identified socio-economic issues affecting development in South Africa.
- The need for sustainable development at a Provincial level, including the need to utilise its extensive resources for the benefits of the local area.
- The identification of renewable energy developments as one of the development priorities within the Namakwa District Municipality Rural Development Plan (RDP) (2022).

[11] Note that the need and desirability of the Geelstert 1 and Geelstert 2 solar PV facilities has been considered in detail within separate Basic Assessment Reports.

5.3. Receptiveness and Desirability of the identified grid connection corridor for the Geelstert Grid Connection

The feasibility of the identified grid connection corridor for the development of the Geelstert Grid Connection also provides an indication of the desirability of the development within the area. The section below provides a description of the specific considerations that contribute to the desirability of the identified grid connection corridor.

Land Availability and Land Use – In order to develop the Geelstert Grid Connection, sufficient space and access to land between the Geelstert 1 and Geelstert 2 solar PV facilities and the Aggeneis MTS (and along the identified corridor) is required. The affected properties associated with the project provide sufficient space for the consideration of the proposed grid connection corridor within which the proposed Geelstert Collector Substation (1.25ha in extent) and the double-circuit power line (of up to 220kV) and the single-circuit power line (of up to 220kV) can be developed within a 47m servitude. The grid connection corridor falls outside of the urban edge of the surrounding Aggeneys town on privately-owned properties currently used for agricultural practises, with mining activities being undertaken within the surrounding area. In addition, the proposed grid connection corridor is parallel to the existing Aries/Aggeneis 400kV power line and the proposed land use of grid connection infrastructure in the area will be consolidated in terms of infrastructure placement As far as could be ascertained, the affected farm portions have not been considered for an alternative land use such as urban development or crop production. The corridor does not infringe on sections of land currently being mined (that is, there is no conflict of surface rights). Therefore, the grid connection corridor is acceptable and desirable from a land availability and land use perspective.

Access to the National Grid – The proponent has consulted with the Eskom regarding the grid connection options in the area. The power line considered is a direct double-circuit overhead power line to the Aggeneis MTS with a capacity of up to 220kV, and a single-circuit power line (of up to 220kV) to connect the authorised Aggeneys 1 and Aggeneys 2 Collector Substation to the Geelstert Collector Substation. The Geelstert Grid Connection will enable the evacuation of electricity generated by the Geelstert 1 and Geelstert 2 solar PV facilities to the national grid. The development of the grid connection eliminates the need for the development of two separate power lines and collector substations from each of the solar PV facilities in order to establish a connection to the national grid. As a result, the grid connection corridor is considered to be the shortest feasible connection to the national grid and therefore limits the infrastructure requirements and on-ground disturbance. The Aggeneis MTS is considered to have adequate capacity in order to evacuate the generated electricity from the Geelstert 1 and Geelstert 2 solar PV facilities into the national grid.

Considering that access to the national grid is readily available through a connection to the Aggeneis MTS, the opportunity to develop consolidated and shared linear infrastructure and the opportunity to minimise the extent of infrastructure required in order to establish a connection to the national grid. As a result, the development of the grid connection infrastructure within the grid connection corridor is identified as desirable.

Geographical and topographical considerations - The terrain traversed by the identified grid connection corridor is fairly flat, providing good conditions for the construction of grid connection infrastructure. The terrain on the site where the Geelstert Collector Substation is proposed is also considered to be technically

suitable for the construction of grid connection infrastructure. In addition, the entire extent of the grid connection corridor is located within the Northern Strategic Transmission Corridor (**Figure 5.1**) which has been identified as an area preferred for the development of large-scale grid connection infrastructure in accordance with GN R113 of 16 February 2018. The grid connection corridor traverses the northern boundary of the Koa River Palaeovalley and the dune habitat within the Bushmanland Sandy Grassland vegetation type, and routes parallel the existing Aries/Aggeneis 400kV power line. In addition, there are numerous ephemeral watercourses and depression wetlands located within the grid connection corridor and its vicinity. These features can be spanned by the proposed power line with no direct infringement on the identified sensitive features. No sensitive environmental features are present within the site proposed for the development of the Geelstert Collector Substation within the grid connection corridor.

Taking the geographical characteristics and the sensitive environmental features (including confirmation from the proponent that these features will be spanned) of the area within which the grid connection corridor is proposed, the grid connection corridor for the Geelstert Grid Connection is considered desirable.

Consideration of sensitive environmental features – Through the assessment of the grid connection corridor within which the grid connection infrastructure can be constructed, an opportunity has been created by the proponent for the avoidance of sensitive environmental features and areas. The consideration of a broader grid connection corridor enables the avoidance of environmental sensitivities, thereby ensuring that the grid connection infrastructure can be appropriately placed without resulting in unacceptable environmental impacts. This consideration is in line with the mitigation strategy and enables the achievement of the objectives of the mitigation hierarchy (i.e. avoid, minimise, mitigate). This application of the mitigation strategy will result in the identification of the optimised placement of the grid connection infrastructure within the grid connection corridor.

Planning – From a planning perspective, the proposed Geelstert Grid Connection is considered to be appropriately located as it is located within the Northern Corridor of the Strategic Transmission Power Corridors (refer to **Figure 5.1**).

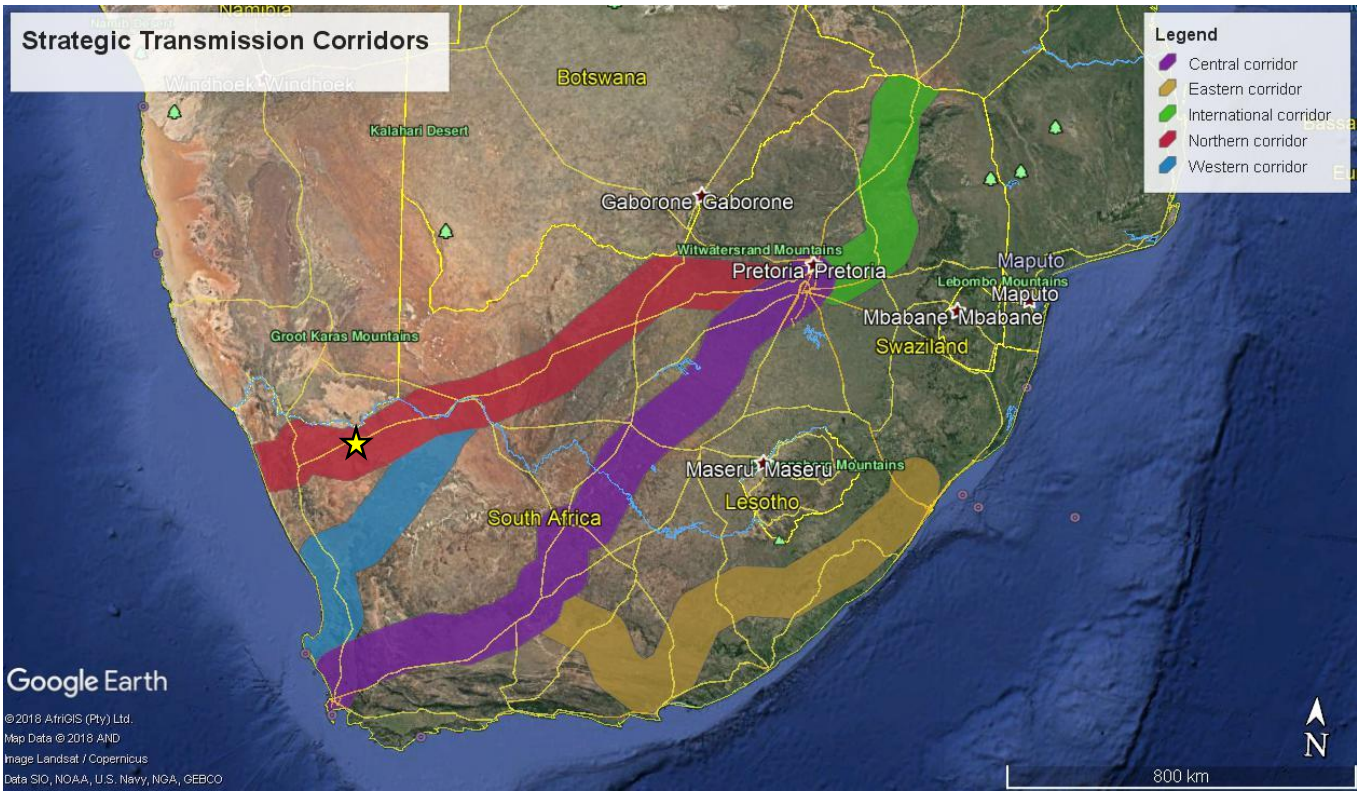

Figure 5.1: Strategic Transmission Corridors identified as the optimal locations where power infrastructure expansion is needed to enable the balancing of future demand and supply requirements, while minimising negative impacts to the environment. The location (shown by the yellow star) and entire extent of the Geelstert Grid Connection Corridor is located within the Northern Strategic Transmission Corridor.

CHAPTER 6: APPROACH TO UNDERTAKING THE BASIC ASSESSMENT PROCESS

In terms of the EIA Regulations of December 2014 (as amended in April 2017) published in terms of the NEMA (Act No. 107 of 1998) as amended, the construction and operation of the Geelstert Grid Connection is a listed activity requiring environmental authorisation as it triggers Activity 11(i)[12] of Listing Notice 1 (GN R327).

The BA process aims at identifying and describing potential environmental issues associated with the development of the proposed grid connection and the associated infrastructure. In order to ensure that a comprehensive assessment is provided to the competent authority and I&APs regarding the impacts of the grid connection, detailed independent specialist studies were undertaken as part of the BA process.

Following the initiation of the Basic Assessment, South Africa was subject to the enforcement of Government Gazette 43096 which placed the country in a national state of disaster limiting the movement of people to curb the spread of the COVID-19 virus. Considering the limitations in place, a comprehensive consultation process was designed and implemented to cater for the undertaking of a full-scale, innovative public participation process which included I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders, while remaining within the limits as stipulated by the National Government. This chapter serves to outline the process that was followed during the BA process.

6.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the final BA report includes the following information required in terms of Appendix 1: Content of the BA Report:

Requirement	Relevant Section
3(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for.	All listed activities triggered by the development of the Geelstert Grid Connection have been included in section 6.2, **Table 6.1**. The specific project activity relating to the relevant triggered listed activity has also been included in **Table 6.1**.
3(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	A public participation plan was prepared and approved by the DEFF (**Appendix C1**). The details of the public participation process undertaken for Geelstert Grid Connection have been included and described in section 6.3.2.

[12] The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.

3(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	All comments raised during the announcement of the BA process and the 30-day review and comment period have been included in the C&R Report (**Appendix C9**) of this final BA Report.
3(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives.	The methodology used to assess the significance of the impacts of the Geelstert Grid Connection has been included in section 6.4.
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	The assumptions and limitations of the BA process being undertaken for the Geelstert Grid Connection are included in section 6.6.

6.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to the Geelstert Grid Connection, as identified at this stage in the process, are described in more detail under the respective sub-headings.

6.2.1 National Environmental Management Act (No. 107 of 1998) (NEMA)

NEMA is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(5) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant EA. Due to the fact that the Geelstert Grid Connection is a electricity transmission and distribution project required to establish a connection between the proposed Geelstert 1 and Geelstert 2 solar PV facilities (both related to the IRP 2010 – 2019) and the national grid; the National DEFF has been determined as the Competent Authority in terms of GN R779 of 01 July 2016. The Provincial Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NC DAEARD&LR) is the Commenting Authority on the project.

The need to comply with the requirements of the EIA Regulations published under the NEMA ensures that proponents are provided the opportunity to consider the potential environmental impacts of their activities early in the project development process, and also allows for an assessment to be made as to whether environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project and Application for Environmental Authorisation.

The BA process being conducted for the Geelstert Grid Connection is undertaken in accordance with Section 24(5) of the NEMA, which defines the procedure to be followed in applying for Environmental Authorisation, and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an EA from the competent authority

subject to the completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA).

As the proposed development triggers Activity 11(i) of Listing Notice 1 (GN R327), the the EIA (Environmental Impact Assessment) process to be followed for the Geelstert Grid Connection will be as per Regulation 19 of the EIA Regulations, 2014 (as amended). Therefore, the Geelstert Grid Connection is subject to a Basic Assessment process, as well as a timeframe of 107 days for the processing of the application for environmental authorisation.

Table 6.1 details the listed activities in terms of the EIA Regulations, 2014 (as amended) that apply to Geelstert Grid Connection, and for which an application for Environmental Authorisation has been submitted to the DEFF. The table also includes a description of the specific project activities that relate to the applicable listed activities.

Table 6.1: Listed activities as per the EIA regulations that are triggered by the Geelstert Grid Connection

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
GN R327, 08 December 2014 (as amended on 07 April 2017)	11(i)	The development of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. ***The Geelstert Grid Connection will require the construction and operation of double-circuit power line of up to 220kV; a Collector Substation stepping up from 22kV or 33kV to 132kV or 220kV and a 220kV single-circuit power line to connect the Geelstert Collector Substation to the Aggeneys 1 and 2 collector substations, which will be connected by the double-circuit 220kV power line to the Aggeneis Main Transmission Substation. The grid connection corridor being assessed for the development of the Geelstert Grid Connection is located outside of an urban area.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	12(ii)(c)	The development of infrastructure with (ii) with a physical footprint of 100 square metres (c) within 32 metres of a watercourse. ***The Geelstert Grid Connection will require the construction of infrastructure within 32m of watercourses within the grid connection corridor.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic meters or more but not exceeding 500 cubic meters. ***The development and operation of the Geelstert Grid Connection will***

		require the storage of 80 cubic metres of dangerous goods, which will include flammable and combustible liquids such as oils associated with the collector substation transformers, lubricants, and solvents
GN R327, 08 December 2014 (as amended on 07 April 2017)	19	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse. ***The development of the Geelstert Grid Connection may require the removal and moving of soil, pebbles or rock of more than 10 cubic metres during the construction phase, as several ephemeral watercourses and depression wetlands are located within and within the vicinity of the grid connection corridor.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation. ***The Geelstert Collector Substation will have an extent of ~ 1.25ha, therefore the clearance of an area exceeding 1ha of indigenous vegetation will be required for the project.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	28(ii)	Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. ***The Geelstert Collector Substation will have an extent of ~ 1.25ha on land currently used for agricultural activities (i.e. grazing by livestock).***
GN R324 08 December 2014 (as amended on 07 April 2017)	4(g)(ii) (bb)(ee)	The development of a road wide than 4 metres with a reserve less than 13.5m in the Northern Cape Province, outside an urban area and within a National Protected Expansion Strategy Focus Area and within a Critical Biodiversity Area. ***The Geelstert Grid Connection will require the development of a 6m wide access road to provide access to the Geelstert Collector Substation and 4m wide jeep tracks to provide access to and along the power line servitude during the construction and operation phase of the project. The grid connection corridor for the Geelstert Grid Connection is located within the Kamiesberg-Bushmanland-Augrabies Focus Area and within a Critical Biodiversity 2 Area (CBA 2).***
	10(ii)(iii) (bb)(ee)	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in the Northern Cape Province, in an area within a watercourse or wetland; or within 100

		metres from the edge of a watercourse or wetland, outside and urban area within a National Protected Expansion Strategy Focus Area and a Critical Biodiversity Area. ***The Geelstert Grid Connection will require the storage and handling facilities of dangerous goods, where such storage exceeds 80 cubic metres and occurs within 100m of ephemeral watercourses and depression wetlands within the Kamiesberg-Bushmanland-Augrabies Focus Area and a Critical Biodiversity Area 2 (CBA 2).***
GN R324 08 December 2014 (as amended on 07 April 2017)	12 (g)(ii)	The clearance of an area of up to 300 square metres or more of indigenous vegetation in the Northern Cape Province within a Critical Biodiversity Area. ***The Geelstert Grid Connection will require the clearance of an area exceeding 300 square metres of indigenous vegetation for the placement of the power line pylons/towers within a Critical Biodiversity Area 2 (CBA 2).***
GN R324 08 December 2014 (as amended on 07 April 2017)	14(ii)(c)(g)(ii) (bb)(ff)	The development of - infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs within 32 metres of a watercourse, measured from the edge of a watercourse in the Northern Cape Province, outside an urban area within a National Protected Area Expansion Focus Strategy Area and a Critical Biodiversity Area. ***The Geelstert Grid Connection will require the development of power line pylons/towers with a physical footprint exceeding 10 square metres within watercourses and within 32m of the watercourses. The grid connection corridor for the Geelstert Grid Connection is located within the Kamiesberg-Bushmanland-Augrabies Focus Area and within a Critical Biodiversity 2 Area (CBA 2)***

6.2.2 National Water Act (No. 36 of 1998) (NWA)

In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all water uses must be licensed with the Competent Authority (i.e. the Regional Department of Water and Sanitation[13]). Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which detrimentally impact on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

[13] The Department of Water and Sanitation (DWS) is soon to be called the Department of Human Settlements, Water and Sanitation.

Table 6.2 lists the possible water uses associated with the proposed project and identified in terms of the NWA which can be authorised under a General Authorisation (GA), or require a WUL application. The table also includes a description of those project activities which relate to the applicable Water Uses.

Table 6.2: List of Water Uses published under Section 21 of NWA, as amended.

Notice No.	Activity No.	Description of Water Use
NWA (No. 36 of 1998)	Section 21 (c)	*Impeding or diverting the flow of water in a watercourse.* ***The grid connection corridor considered for the establishment of the Geelstert Grid Connection is associated with the presence of ephemeral watercourses and depression wetlands[14]. Activities pertaining to the establishment of the grid connection infrastructure (i.e. power line pylons/towers, access road and jeep tracks, etc.) might encroach on the ephemeral watercourses and the catchment areas of the depression wetlands, which may lead to an impediment and diversion of the flow of water within these features.***
	Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. ***The grid connection corridor considered for the establishment of the Geelstert Grid Connection is associated with the presence of ephemeral watercourses and depression wetlands. Activities pertaining to the establishment of the grid connection infrastructure (i.e. power line pylons/towers, access road and jeep tracks, etc.) might encroach on the ephemeral watercourses and the catchment areas of the depression wetlands, which may lead to an alteration of the characteristics of these features.***

In the event that the flow of water in any of the watercourses is affected and the bed, banks or course characteristics are altered as a result of the development of the Geelstert Grid Connection, an application would need to be made for a WUL in accordance with the requirements of the Regulations Regarding the Procedural Requirements for Water Use License Applications and Appeals (GN R267), or a GA registered in accordance with the requirements of Revision of General Authorisation. The process of applying for a WUL or GA registration will only be completed once a positive EA has been received and prior to the

[14] 'watercourse' means –
(a) a river or spring'
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

commencement of the bidding process under the DMRE's REIPPPP. This is in line with the requirements of the Department of Water and Sanitation.

6.2.3 National Heritage Resources Act (No. 25 of 1999) (NHRA)

The National Heritage Resources Act (No. 25 of 1999) (NHRA) provides an integrated system which allows for the management of national heritage resources and to empower civil society to conserve heritage resources for future generations. Section 38 of NHRA provides a list of activities which potentially require the undertaking of a Heritage Impact Assessment.

Section 38: Heritage Resources Management

1). Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as –

a. the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

b. the construction of a bridge or similar structure exceeding 50m in length;

c. any development or other activity which will change the character of a site –

i). exceeding 5 000m² in extent; or

ii). involving three or more existing erven or subdivisions thereof; or

iii). involving three or more erven or divisions thereof which have been consolidated within the past five years; or

iv). the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

Must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the Geelstert Grid Connection, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).

6.3 Overview of the Basic Assessment Process for the Geelstert Grid Connection

Key tasks undertaken for the BA included:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
» Submission of the completed Application for Environmental Authorisation to the competent authority (i.e. DEFF) in terms of Regulations 5 and 6 of the EIA Regulations, 2014 (GNR 326), as amended.

- Undertaking a public participation process in accordance with Chapter 6 of GN R326, and the Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa (hereinafter referred to as "the Guidelines") in order to identify issues and concerns associated with the proposed project.
- Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR326), as amended[15].
- Preparation of a BA Report and EMPr in accordance with the requirements of Appendix 1 and Appendix 4 of GN R326.
- 30-day public and authority review period of the BA report.
- Compilation of a C&R report detailing the comments raised by I&APs, addressing these comments in detail and finalisation of the BA report.
- Submission of a final BA report to the DEFF for review and decision-making.

The tasks are discussed in detail in the sub-sections below.

6.3.1. Authority Consultation and Application for Authorisation in terms of the EIA Regulations, 2014 (as amended)

In terms of Government Notice 779 of 01 July 2016, the National Department of Environment Forestry and Fisheries (DEFF) is the competent authority for all projects related to the IRP. As the project is located within the Northern Cape Province, the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NC DAEARD&LR) is the commenting authority. Consultation with the regulating authorities (i.e. DEFF and NC DAEARD & LR) as well as with all other relevant Organs of State will continue throughout the BA process. To date, this consultation has included the following:

- Requesting of a Pre-Application Meeting with DEFF on 22 June 2020 to discuss the Public Participation Plan and project details. The DEFF requested that the Public Participation Plan be submitted to the Department via email for approval. Following the submission of the plan, the DEFF provided approval of the submitted Plan via email on 25 June 2020 and advised that the Pre-Application Meeting is not required for the project.
- Submission of the application form for Environmental Authorisation to the DEFF via the use of the DEFF Novell Filr System.
- Submission of the BA Report for review and comment by:
  - The competent and commenting authorities.
  - State departments that administer laws relating to a matter affecting the environment relevant to an application for Environmental Authorisation.

[15] The independent specialist studies (**Appendix D-J**) were initiated prior to 8 May 2020, and comply with the requirements of Appendix 6 of the EIA Regulations, 2014 (as amended), as per the direction provided by the DEFF on 02 July 2020 (refer to **Appendix P**). The date of appointment of specialists is also confirmed in **Appendix P**.

* Organs of State which have jurisdiction in respect of the activity to which the application relates.

The submissions, as listed above, were undertaken electronically, as required by the DEFF (in line with the directions for new Applications for Environmental Authorisations provided for in GN R650 of 05 June 2020).

A record of all authority correspondence undertaken during the BA process is included in **Appendix B** and **Appendix C**.

6.3.2. Public Participation Process

Public participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations 41 to 44 of the EIA Regulations 2014 (GN R326) (as amended). The purpose of public participation is clearly outlined in Regulation 40 of the EIA Regulations 2014 (GN R326) (as amended) and is being followed for this proposed project.

The Public Participation Process undertaken for the Geelstert Grid Connection considers the restrictions and limitations imposed by Government through section 27 (2) of the Disaster Management Act (Act No. 57 of 2002) of 2002 and the Directions issued by the Minister of Environment, Forestry and Fisheries (DEFF) in terms of consultations with I&APs. A Public Participation Plan was prepared and submitted to the DEFF on 22 June 2020. Approval of the Plan was provided by the DEFF Case Officer via email on 25 June 2020 (**Appendix B**).

The alternative means of undertaking consultation have been designed and implemented by Savannah Environmental to ensure that I&APs are afforded sufficient opportunity to access project information and raise comments on the project through an interactive web-based platform (i.e. online stakeholder engagement platform) readily available and accessible to any person registering their interest in the project, and ensures that the public participation process is undertaken in line with Regulations 41 to 44 of the EIA Regulations, 2014 as amended. The Public Participation Plan (**Appendix C1**) considers the limitations applied by the Disaster Management Act Regulations prohibiting the gathering of people, as well as limitations which certain I&APs may have in terms of access to computers and internet as well as access to public spaces currently not open for operation that inhibits access to hard copy documentation. The online stakeholder engagement platform implemented by Savannah Environmental for the project allows the EAP to visually present details regarding the project as well as consultation documentation, including project maps and plans, presentations and posters. The platform also contained the BA report that was made available for review. The use of an online tool enables stakeholders and I&APs to explore the project-specific content in their own time, and still enables them to participate in a meaningful way in the consultation process. The online platform allows for instant feedback and comments to be submitted, in so doing saving time for the stakeholder and also giving the assurance that their comments have been submitted for inclusion in the project reporting.

The sharing of information forms the basis of the public participation process and offers the opportunity for I&APs to become actively involved in the BA process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner. The public participation process affords I&APs opportunities to provide input into and receive information regarding the BA process in the following ways:

During the BA process:

- provide an opportunity to submit comments regarding the project;
- assist in identifying reasonable and feasible alternatives;
- contribute relevant local information and knowledge to the environmental assessment;
- allow registered I&APs to verify that their comments have been recorded, considered and addressed, where applicable, in the environmental investigations;
- foster trust and co-operation;
- generate a sense of joint responsibility and ownership of the environment; and
- comment on the findings of the environmental assessments.

During the decision-making phase:

- to advise I&APs of the outcome of the competent authority's decision, and how and by when the decision can be appealed.

The public participation process therefore aims to ensure that:

- Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs for their review.
- The information presented during the public participation process is presented in such a manner, i.e. local language and technical issues, that it avoids the possible alienation of the public and prevents them from participating.
- Public participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the project.
- A variety of mechanisms are provided to I&APs to correspond and submit their comments i.e. fax, post, email, telephone, text message (SMS and WhatsApp), or online through the project's online platform.
- An adequate review period is provided for I&APs to comment on the findings of the BA Report.

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, as amended, the following key public participation tasks are required to be undertaken:

- Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
  - (i) the site where the activity to which the application relates is or is to be undertaken; and
  - (ii) any alternative site mentioned in the application;
- Give written notice to:
  - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
  - (v) the municipality which has jurisdiction in the area;
  - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
  - (vii) any other party as required by the competent authority.

- Place an advertisement in one local newspaper.
- Open and maintain a register of I&APs and Organs of State.
- Release of a BA Report for a 30-day review and comment period.
- Prepare a Comments and Responses (C&R) report which documents the comments received on the BA process and during the 30-day review period and the responses provided by the project team.

In compliance with the requirements of Chapter 6: Public Participation of the EIA Regulations, 2014 (as amended), and the approved Public Participation Plan, the following summarises the key public participation activities implemented. The schematic below provides an overview of the tools that are available to I&APs and stakeholders to access project information and interact with the public participation team to obtain project information and resolve any queries that may arise, and to meet the requirements for public participation.

i. Stakeholder identification and register of I&APs	•Register as an I&AP on the online platfrom via completion of a form and provison of contact information, by responding to an advert, or sending a 'please call me' which will be responded to •State interest in the project •Receive all project related information via email
ii. Advertisments and notifications	•Advertisements, site notices and/or radio announcements and notifications provide information and details on where to access project information •Notifications regarding the EIA process and availability of project reports for public review to be sent via email, post or SMS notifications
iii. Public Involvement and consultation	•Distribution of a BID providing details on the project and how I&APs can become involved in the process •Submission of comments or queries via the online platform to the PP team •Virtual presentations (both English and Afrikaans) available via the online platform •Availability of project information via the online platform •An opportunity for I&APs and stakeholders to request virtual meetings with the project team
iv. Comment on the BA Report	•Availability of the project reports via the online platform for 30-day comment period •Submission of comments via the online platform, email or post to the PP team •Comments recorded and responded to, as part of the process
v. Identification and recording of comments	•Comments and Responses Report, including all comments received, and included within the final Report for decision-making

i. Stakeholder identification and Register of Interested and Affected Parties

42. A proponent or applicant must ensure the opening and maintenance of a register of I&APs and submit such a register to the competent authority, which register must contain the names, contact details and addresses of –
    (a) All persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;
    (b) All persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and
    (c) All organs of state which have jurisdiction in respect of the activity to which the application relates.

I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the greater surrounding area and a registration process involving the completion of a reply form. Key stakeholders and affected and surrounding landowners have been identified and registered on the project database. Other stakeholders were required to formally register their interest in the project through either directly contacting the Savannah Environmental Public Participation team via phone, text message (SMS and WhatsApp), email or fax, or registering their interest via the online stakeholder engagement platform. An initial list of key stakeholders identified and registered is listed in **Table 6.3**.

Table 6.3: Initial list of Stakeholders identified for the inclusion in the project database during the public participation process for the Geelstert Grid Connection

Organs of State
National Government Departments[16]
Department of Environment, Forestry and Fisheries
Department of Mineral Resources
Department of Energy
Department of Agriculture Forestry and Fisheries
Department of Water and Sanitation
Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
South African Civil Aviation Authority (CAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
South African Radio Astronomy Observatory (SARAO)
Telkom SA SOC Limited

[16] These government departments are soon to be known as the Department of Resources and Energy (DMRE), Department of Agriculture, Land Reform and Rural Development (DALRD) and the Department of Human Settlements, Water and Sanitation.

Transnet SA SOC Limited
Provincial Government Departments
Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform
Northern Cape Department of Roads and Public Works
Ngwao Boswa Kapa Bokone (NBKB) – provincial Heritage Authority
Local Government Departments
Namakwa District Municipality
Khâi-Ma Local Municipality – including the Ward Councillor, ward committee members, community representative or local community forum members
Commenting Stakeholders
BirdLife South Africa
Endangered Wildlife Trust (EWT)
SENTECH
Wildlife and Environment Society of South Africa (WESSA)
Landowners
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the Public Participation Guidelines has also been followed. The register of I&APs contains the names[17] of:

- all persons who requested to be registered on the database through the use of the online stakeholder engagement platform or in writing and disclosed their interest in the project;
- all Organs of State which hold jurisdiction in respect of the activity to which the application relates; and
- all persons who submitted written comments or attended virtual meetings and viewed the narrated presentations on the Savannah Environmental online platform during the public participation process.

I&APs have been encouraged to register their interest in the BA process from the onset of the project, and the identification and registration of I&APs has been on-going for the duration of the BA process. The database of I&APs will be updated throughout the BA process and will act as a record of the I&APs involved in the public participation process.

[17] Contact details and addresses have not been included in the I&AP database as this information is protected by the Protection of Personal Information Act (No 4 of 2013).

ii. Advertisements and Notifications

40.(2)(a) Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of –
- (i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and
- (ii) Any alternative site.

40.(2)(b) Giving written notice, in any of the manners provided for in section 47D of the Act, to –
- (i) The occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
- (ii) Owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
- (iii) The municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;
- (iv) The municipality which has jurisdiction in the area;
- (v) Any organ of state having jurisdiction in respect of any aspect of the activity; and
- (vi) Any other party as required by the competent authority.

40.(2)(c) Placing an advertisement in –
- (i) One local newspaper; or
- (ii) Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;

40.(2)(d) Placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and

40.(2)I Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to –
- (i) Illiteracy;
- (ii) Disability; or
- (iii) Any other disadvantage.

The BA process was announced with an invitation to the Organs of State, potentially affected and neighbouring landowners and general public to register as I&APs and to actively participate in the process. This was achieved via the following:

» Compilation of a background information document (BID) (refer to **Appendix C4**) providing technical and environmental details on the project and how to become involved in the BA process. The BID and the BA process notification letters announcing the BA process, notifying Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/IAPs of the Geelstert Grid Connection, and providing background information of the project and inviting I&APs to register on the project's database were distributed via email on **13 July 2020**. The evidence of the distribution is contained in **Appendix C** of the final BA Report. The BID is also available electronically on the Savannah Environmental website (www.savannahsa.com/public-documents/energy-generation/geelstert-1-and-geelstert-2-solar-pv-facilities-and-associated-grid-connection/).

- Placement of site notices announcing the BA process at visible points along the boundary of the study area (i.e. the boundaries of the affected property), in accordance with the requirements of the EIA Regulations on **24 June 2020**. Photographs and the GPS co-ordinates of the site notices are contained in **Appendix C3**.
- Placement of an advertisement in the Gemsbok Newspaper on **19 August 2020** at the commencement of the 30-day review and comment period (**Appendix C3**). This advert:
  - announced the project and the associated BA process,
  - announced the availability of the BA report, the review period, and where it is accessible for review, and invited comment on the BA Report,
  - provided all relevant details to access the Savannah Environmental online stakeholder engagement platform.
- A copy of the newspaper advert as sent to the newspaper is included in **Appendix C3** of the final BA Report. The newspaper advert tear sheet is included in **Appendix C3.**
- A Radio Live Read by Radio NFM (98.1FM) on **20 August 2020** at the commencement of the 30-day review and comment period (**Appendix C3**). Further Radio Live Read segments were undertaken at Radio NFM as a reminder of the availability of the BA report for review and comment on **31 August 2020** and **14 September 2020**. Radio NFM is the local radio station covering the area surrounding the Geelstert Grid Connection corridor.
- The BA Report was made available for review by I&APs for a 30-day review and comment period from **20 August 2020** to **21 September 2020.** An electronic version of the BA Report (CD and/or Dropbox access link) was circulated to Organs of State via courier and/or email at the commencement of the 30-day review period, where requested. The full BA Report was also available on the Savannah Environmental website. The evidence of distribution of the BA Report has been included in **Appendix C**.

iii. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the surrounding area, as well as capture their views, comments, issues and concerns regarding the project, various opportunities have been and will continue to be provided to I&APs to note their comments and issues. I&APs were consulted through the following means:

Table 6.4: Public involvement for the Geelstert Grid Connection

Activity	Date
Placement of site notices.	24 June 2020
Distribution of the BID, process notification letters and stakeholder reply form announcing the BA process and inviting I&APs to register on the project database. The BID and electronic reply form was also made available on the online stakeholder engagement platform.	13 July 2020
Advertising of the availability of the BA Report for a 30-day review and comment period in Gemsbok Newspaper, including details on how to access the BA Report via the online stakeholder engagement platform.	19 August 2020

Radio Live Read by the Radio NFM (98.1FM) advertising the availability of the BA Report for a 30-day review and comment period, and the details of how to get involved and how contact with Savannah Environmental can be made.	20 August 2020 31 August 2020 14 September 2020
Distribution of notification letters announcing the availability of the BA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners) and key stakeholder groups.	19 August 2020
30-day review and comment period of the BA Report.	20 August 2020 – 21 September 2020
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions.	Meetings held included: » Focus Group Meeting held with the Department of Agriculture, Forestry and Fisheries via Zoom on 08 September 2020 » Focus Group Meeting held with the Northern Cape Department of Agriculture, Environmental Affairs, Land Reform and Rural Development via Microsoft Teams on 08 September 2020 » Focus Group Meeting held with the Namakwa District Municipality via Microsoft Teams on 09 September 2020 » Focus Group Meeting held with the Landowners on 09 September 2020 Refer to **Appendix C8** for meeting minutes
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs.	Throughout BA process

iv. Registered I&APs entitled to Comment on the BA Report

43.(1) A registered I&AP is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.

(2) In order to give effect to section 24O of the Act, any State department that administers a law relating to a matter affecting the environment must be requested, subject to regulation 7(2), to comment within 30 days.

44.(1) The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.

(2) Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to –
(a) A lack of skills to read or write;
(b) Disability; or

(c) Any other disadvantage;
Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database were notified by means of a notification letter of the release of the BA Report for a 30-day review and comment period, invited to provide comments on the BA Report, and informed of the manner in which, and timeframe within which such comments must be made. The report was made available in soft copies to I&APs due to restrictions and limitations on public spaces during the national state of disaster related to COVID-19. No hard copies of the report were made available for review and comment.

The BA Report was also made available on the Savannah Environmental website (i.e. online stakeholder engagement platform: www.savannahsa.com/public-documents/energy-generation/geelstert-1-and-geelstert-2-solar-pv-facilities-and-associated-grid-connection/). The notification of the availability of the BA Report was distributed prior to commencement of the 30-day review and comment period, on **19 August 2020**. Where I&APs were not able to provide written comments (including SMS and WhatsApp), other means of consultation, such telephonic discussions were used to provide the I&APs with a platform to verbally raise their concerns and comments on the proposed development. Submission of comments were enabled through the use of the Savannah Environmental online stakeholder engagement platform.

All comments raised as part of the discussions and written comments submitted during the 30-day review and comment period have been recorded and included in **Appendix C9** of this final BA Report.

v. Identification and Recording of Comments

Comments raised by I&APs over the duration of the BA process have been synthesised into a Comments and Responses (C&R) Report which is included in **Appendix C9** of this final BA Report. These include comments raised through the use of the Savannah Environmental online stakeholder engagement platform. The C&R Report includes detailed responses from members of the EIA project team and/or the project proponent to the issues and comments raised during the public participation process.

Following the distribution of the process notification letter and BID on 13 July 2020, specific comments were raised and recorded, and addressed as part of the BA Report that was made available for the 30-day review period. The main comments submitted to Savannah Environmental prior to the release of the BA report pertained to the impact on avifauna (submitted by Samantha Ralston-Paton of BirdLife South Africa) and specifically the presence of Red Lark Habitat in the area; and the potential impact of the project on areas formally set aside as biodiversity offsets by the Black Mountain Mine for the Gamsberg Mine operating in the Aggeneys area (submitted by (Mark Botha of Conservation Strategy, Tactics and Insight).

The comment raised on the impact of avifauna, and specifically the Red Lark, was addressed and fully assessed (including the provision of appropriate mitigation measures) through the undertaking of an Avifauna Impact Assessment (**Appendix E**). The requirements for the assessment of impacts on heritage resources has been complied with through the undertaking of a Heritage Report (**Appendix H** and **Appendix H1**) which considers the archaeological and palaeontological resources, and the sensitivity thereof, within the grid connection corridor proposed for development. The comments pertaining to the location of the proposed

project within areas considered for biodiversity offsets was resolved through further consultation with the I&AP and officials from the DENC. Specific project information, as per the request of the I&AP, was submitted for their consideration in order to further advise and confirm the location of the biodiversity offset areas in relation to the project. It was confirmed via email that grid connection corridor for the Geelstert Grid Connection does not fall within an area set aside for biodiversity offsets, which was also confirmed by Conrad Geldenhuys of the DENC (now referred to as the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform).

Further to the above, meeting notes of all the telephonic discussions and virtual meetings conducted during the 30-day review and comment period of the BA Report have been included in **Appendix C8**.

The C&R Report has been updated with all comments received during the 30-day review and comment period and is included as **Appendix C9** in this final BA Report submitted to the DEFF for decision-making.

6.4 Assessment of Issues Identified through the BA Process

Issues identified as requiring investigation, as well as the specialist consultants involved in the assessment of these impacts are indicated in **Table 6.5** below.

Table 6.5: Specialist consultants appointed to evaluate the potential impacts associated with the Geelstert Grid Connection

Specialist Name	Specialist Company	Specialist Area of Expertise	Appendices
Simon Todd	3Foxes Biodiversity Consulting (Pty) Ltd	Ecology	Appendix D
Eric Hermann	3Foxes Biodiversity Consulting (Pty) Ltd	Avifauna	Appendix E
Gerhard Botha	Nkurenkuru Ecology & Biodiversity	Freshwater	Appendix F
Garry Paterson	Agricultural Research Council: Soil, Climate, Water (SCW)	Soils and Agricultural Potential	Appendix G
Jenna Lavin	CTS Heritage (Pty) Ltd	Heritage	Appendix H Appendix H1
Jon Marshall	Environmental Planning and Design (Pty) Ltd	Visual	Appendix I Appendix I1
Lisa Opperman and Neville Bews	Savannah Environmental (Pty) Ltd and Neville Bews and Associates	Social	Appendix J
Amory Le Roux-Arries	Knight Piésold	Traffic Impact	Appendix K

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of the Geelstert Grid Connection. Issues were assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected;
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high);
- The **duration**, wherein it is indicated whether:

- The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
- The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
- Medium-term (5–15 years) – assigned a score of 3;
- Long term (> 15 years) - assigned a score of 4;
- Permanent - assigned a score of 5.

» The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
- 0 is small and will have no effect on the environment;
- 2 is minor and will not result in an impact on processes;
- 4 is low and will cause a slight impact on processes;
- 6 is moderate and will result in processes continuing but in a modified way;
- 8 is high (processes are altered to the extent that they temporarily cease);
- 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

» The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
- Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
- Assigned a score of 2 is improbable (some possibility, but low likelihood);
- Assigned a score of 3 is probable (distinct possibility);
- Assigned a score of 4 is highly probable (most likely);
- Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

» The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;

» The **status**, which is described as either positive, negative or neutral;

» The degree to which the impact can be reversed;

» The degree to which the impact may cause irreplaceable loss of resources;

» The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

S = (E+D+M) P; where

S = Significance weighting.
E = Extent.
D = Duration.
M = Magnitude.
P = Probability.

The **significance weightings** for each potential impact are as follows:

» **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area);

» **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated);

» **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

As the proponent has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations, 2014 (as amended)), the mitigation of significant impacts is discussed. An assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. An Environmental Management Programme (EMPr) that includes all the mitigation measures recommended by the specialists for the management of significant impacts is included as **Appendix L**.

6.5 Outcomes of the DEFF Web-Based Screening Tool

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the EIA Regulations, 2014 (as amended), the submission of a Screening Report generated from the National Web-Based Environmental Screening Tool is compulsory for the submission of applications in terms of Regulations 19 and 21 of the EIA Regulations.

The requirement for the submission of a Screening Report (included as **Appendix K** of this final BA Report) for the Geelstert Grid Connection is applicable as it triggers Regulation 19 of the EIA Regulations, 2014 (as amended). **Table 6.6** provides a summary of the specialist assessments identified in terms of the screening tool and responses to each assessment from the project team considering the development area under consideration.

Table 6.6: Sensitivity ratings from the DEFF's web-based online Screening Tool associated with the development of the Geelstert Grid Connection

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating the to need for the study)	Project Team Response
Agricultural Impact Assessment	Low	The findings of a Soils, Land Use and Agriculture Impact Assessment indicate that the development area under consideration for the development of Geelstert Grid Connection is associated with a low agricultural potential. The Soils, Land Use and Agriculture Impact Assessment is included in this final BA Report as **Appendix G**.
Landscape/Visual Impact Assessment	Screening Report did not include a rating for this theme; however, the specialist assessment was identified based on the technology proposed.	A Visual Impact Assessment has been undertaken for the Geelstert Grid Connection and is included in this final BA Report as **Appendix I** and **Appendix I1**.
Archaeological and Cultural Heritage Impact Assessment	Screening Report did not include a rating for this theme; however, the specialist assessment was identified based on the extent of the infrastructure components of the Geelstert Grid Connection	A Heritage Report (which covers both archaeological and cultural aspects of the grid connection corridor) has been undertaken for the Geelstert Grid Connection and is included in this final BA Report as **Appendix H** and **Appendix H1**.

	in accordance with Section 38 (1) of the National Heritage Act (Act No. 25 of 1999).	
Palaeontology Impact Assessment	Screening Report did not include a rating for this theme; however, the specialist assessment was identified based on the extent of the infrastructure components of the Geelstert Grid Connection in accordance with Section 38 (1) of the National Heritage Act (Act No. 25 of 1999) of 1999.	The Heritage Report (included as **Appendix H** and **Appendix H1**) of the final BA Report includes an assessment of palaeontological resources within the grid connection corridor for the Geelstert Grid Connection corridor.
Terrestrial Biodiversity Impact Assessment	Very High	An Ecological Impact Assessment (including flora and fauna) has been undertaken for the Geelstert Grid Connection and is included as **Appendix D** of this final BA Report.
Aquatic Biodiversity Impact Assessment	Very High	A Freshwater Resource Study & Assessment has been undertaken for the Geelstert Grid Connection and is included as **Appendix F** of this final BA Report.
Avian Impact Assessment	Screening Report did not include a rating for this theme; however, the specialist assessment was identified based on the technology proposed.	An Avifauna Impact Assessment has been undertaken for the Geelstert Grid Connection and is included as **Appendix E** of this final BA Report.
Civil Aviation Assessment	High	The grid connection corridor is located 1.3km south and south-west of the Aggeneys Aerodrome. The Civil Aviation Authority (CAA) and the owner of the Aggeneys Aerodrome will be consulted during the 30-day review and comment period of the BA Report to provide written comments on the proposed development.
RFI Assessment	Screening Report did not include a rating for this theme.	The grid connection corridor under consideration for the development of the Geelstert Grid Connection, is outside the radius of the Karoo Central Astronomy Advantage Area declared in terms of the Astronomy Geographic Advantage Act (Act No. 21 of 2007) of 2007. The South African Radio Astronomy Observatory (SARAO) will however be consulted during the 30-day review and comment period of the BA Report to provide written comments on the proposed development.
Geotechnical Assessment	Screening Report did not	A Geotechnical Assessment of the Geelstert Grid

	include a rating for this theme.	Connection will be undertaken by the proponent after the project has been granted EA by the Competent Authority and the project has been awarded preferred bidder status under the DMRE's REIPPP Programme.
Plant Species Assessment	Low	An Ecological Impact Assessment (including flora and fauna) has been undertaken for the Geelstert Grid Connection and is included as **Appendix D** of this final BA Report.
Animal Species Assessment	Low	

6.6 Assumptions and Limitations of the BA Process

The following assumptions and limitations are applicable to the studies undertaken within this BA process:

- All information provided by the proponent and I&APs to the environmental team was correct and valid at the time it was provided.
- It is assumed that the grid connection corridor for the Geelstert Grid Connection identified by the proponent represents a technically suitable grid connection corridor for the establishment of the Geelstert Grid Connection which is based on the design undertaken by technical consultants for the project.
- This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other grid connection corridor alternatives.

Refer to the specialist studies in **Appendices D – J** for specialist study specific limitations.

6.7 Legislation and Guidelines that have informed the preparation of this Basic Assessment Report

The following legislation and guidelines have informed the scope and content of this final BA Report:

- National Environmental Management Act (Act No. 107 of 1998);
- EIA Regulations of December 2014, published under Chapter 5 of NEMA (as amended);
- Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations;
- Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation; and
- International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

Table 6.7 provides an outline of the legislative permitting requirements applicable to the Geelstert Grid Connection as identified at this stage in the project process.

Table 6.7: Applicable Legislation, Policies and/or Guidelines associated with the development of the Geelstert Grid Connection

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* * *Prevent pollution and ecological degradation,* * *Promote conservation, and* * *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. Considering that the development of the Geelstert Grid Connection triggers Activity 11(i) of Listing Notice 1 (GN R327), a Basic Assessment Process is required to be undertaken for the proposed project in accordance with	DEFF – Competent Authority Northern Cape DAEARD&LR	The listed activities triggered by the proposed project have been identified and assessed as part of the BA process. The BA process will culminate in the submission of a final BA Report to the competent authority in support of the application for EA.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Regulation 19 of the EIA Regulations, 2014 (as amended). All relevant listing notices for the project (GN R327 and GN R324) will be applied for.		
National Environmental Management Act (No 107 of 1998) (NEMA)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DEFF Northern Cape DAEARD&LR	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (No. 73 of 1989) (ECA)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	DEFF Northern Cape DAEARD&LR Khâi-Ma Local Municipality	Noise impacts are expected to be associated with the construction phase of the project. Considering the location of the grid connection in relation to the town of Aggeneys (where residential areas are mainly located) and provided that appropriate mitigation measures are implemented, construction noise is unlikely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of the legislation.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Water Act (No. 36 of 1998) (NWA)	A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is permissible under a GA, or if a responsible authority waives the need for a licence. Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)). Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).	Regional Department of Water and Sanitation	Ephemeral watercourses and depression wetlands are present within the grid connection corridor and its vicinity. Where the development activities impede or divert the flow of water in a watercourse, or alter the bed, banks, course or characteristics of a watercourse, Section 21(c) and 21(i) of the NWA (Act 36 of 1998) would be triggered and the project proponent would need to apply for a WUL or register a GA with the DWS.
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.	Department of Mineral Resources and Energy (DMRE)	Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA in this regard is not required to be obtained.
	Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is		In terms of Section 53 of the MPRDA approval is required from the Minister of Mineral Resources and Energy to ensure

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	likely to impede any such object must apply to the Minister for approval in the prescribed manner.		that the proposed development does not sterilise a mineral resource that might occur on site.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM: AQA)	The National Dust Control Regulations (GNR 827) published under Section 32 of NEM: AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas. In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme. Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.	Northern Cape Northern Cape DAEARD&LR / Namakwa District Municipality	In the event that the project results in the generation of excessive levels of dust the possibility could exist that a dust fall monitoring programme would be required for the project, in which case dust fall monitoring results from the dust fall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed. However, with mitigation measures implemented, the Geelstert Grid Connection is not anticipated to result in significant dust generation.
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority.	South African Heritage Resources Agency (SAHRA) Ngwao Boswa Kapa Bokone (NBKB) – provincial heritage authority	A Heritage Report has been undertaken as part of the BA process (refer to **Appendix H** and **Appendix H1** of this final BA Report). No sites of high or medium heritage significance were identified within the grid connection corridor for the Geelstert Grid Connection. Should a heritage resource be impacted upon by the development of the Geelstert Grid Connection, a permit may be required from SAHRA or Ngwao Boswa

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development. Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		Kapa Bokone (NBKB) in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668). This will be determined as part of the final walk-through-survey once the final location of the grid connection infrastructure components (i.e. power line pylons/towers and Collector Substation, etc.) within the grid connection corridor has been determined.
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596,	DEFF Northern Cape DAEARD&LR	Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species. Two (2) listed terrestrial mammals may occur within the Geelstert Grid Connection corridor; these include the Vulnerable Leopard *Panthera pardus* and the Black-footed Cat *Felis negripes.* Given the extremely low vegetation cover within the grid connection area, it is unlikely that Leopards are present. The habitat is however broadly suitable for the Black-footed Cat, which favours a mix of open and densely vegetated areas. This species is widely distributed across the arid and semi-arid areas of South Africa and the development of the Geelstert Grid Connection would not amount to a significant habitat loss for these species.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	GNR 324), 29 April 2014).		
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out. Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).	DEFF Northern Cape DAEARD&LR	There is a possibility of the presence of minor *Prosopsis glandulosa* invasions particularly around watering points within the Geelstert Grid Connection corridor, but in general, there are a few invasive alien plant species present across most of the grid connection corridor. The *Prosopsis glandulosa* is a Category 3 Listed Invasive Species in the Northern Cape Province in terms of the NEMBA: Alien and Invasive Species List, 2016 (GN R864 of 2016).
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of GN R1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. Regulation 15E of GN R1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.	Department of Agriculture, Land Reform and Rural Development (DALRD)	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a Weed Control and Management Plan must be implemented. In terms of Regulation 15E (GN R1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods: » Uprooting, felling, cutting or burning. » Treatment with a weed killer that is registered for use in connection with such plants in accordance with the

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			directions for the use of such a weed killer. » Biological control carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation 4. » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".	Northern Cape DAEARD&LR	A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present within the grid connection corridor for the submission of relevant permits to authorities prior to the disturbance of these individuals. The Ecological Impact Assessment (refer to **Appendix D** of this final BA Report) included the identification of any protected tree species which may require a license in terms of the NFA (No. 84 of

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			1998). No NFA-listed tree species were identified within the grid connection corridor for the Geelstert Grid Connection.
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.	DEFF	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the Geelstert Grid Connection, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.
Hazardous Substances Act (No. 15 of 1973) (HAS)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain	Department of Health (DoH)	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		If applicable, a license would be required to be obtained from the Department of Health (DoH).
National Environmental Management: Waste Act (No. 59 of 2008) (NEM: WA)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of NEM: WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities.	DEFF – Hazardous Waste Northern Cape DAEARD&LR – General Waste	No waste listed activities are triggered by the Geelstert Grid Connection, therefore, no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation phase of the project. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM: WA will need to be considered in this regard.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented.		
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of	South African National Roads Agency (SANRAL) – national roads Northern Cape Department of Transport, Safety and Liaison	An abnormal load / vehicle permit may be required to transport the various components to site for the construction of the Geelstert Grid Connection. These include route clearances and permits required for vehicles carrying abnormally heavy or abnormally dimensioned loads and transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the power line pylon/tower structures and Collector Substation components may not meet specified dimensional limitations (height and width) and will require a permit from the relevant authorities.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		
	Provincial Policies / Legislation		
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; The Act provides lists of protected species for the Province.	Northern Cape DAEARD&LR	A collection/destruction permit must be obtained from Northern Cape DAEARD&LR for the removal of any protected plant or animal species found within the grid connection corridor. Species of conservation concern that may be present within the Geelstert Grid Connection corridor include, *Boscia foetida subsp. foetida* and *Hoodia gordonii*. Should these species be confirmed within the grid connection during any phase of the proposed development, permits will be required from the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development & Land Reform (NC DAEARD&LR).

CHAPTER 7: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter provides a description of the local environment. This information is provided in order to assist the reader in understanding the possible effects of the project on the environment within which it is proposed to be developed. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the Geelstert Grid Connection have been described. This information has been sourced from both existing information available for the area as well as collected field data by specialist consultants and aims to provide the context within which this BA process is being conducted.

7.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the final BA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
3(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The environmental attributes associated with the grid connection corridor, as well as the surrounding environment, are described and considered within this chapter and include the following:
	» The regional setting within which the Geelstert Grid Connection corridor is located is described in section 7.2.
	» The climatic conditions of the area within which Geelstert Grid Connection corridor is located is discussed in section 7.3.
	» The biophysical characteristics of the Geelstert Grid Connection corridor and the surrounding areas is described in section 7.4. This includes the topography and terrain, geology, soils and agricultural potential and the ecological profile of the site (i.e. vegetation, fine-scale habitats, critical biodiversity areas and broad-scale processes, freshwater features, terrestrial fauna, and avifauna).
	» The heritage of the Geelstert Grid Connection corridor and the surrounding areas (including the archaeology, palaeontology, and cultural landscape) is discussed in section 7.5.
	» The visual quality of the affected environment is discussed in section 7.6.
	» The current traffic conditions for the area surrounding the grid connection corridor are included in section 7.7.
	» The social context within which the Geelstert Grid Connection is located is described in section 7.8.

A more detailed description of each aspect of the affected environment is included in the specialist reports contained within the **Appendices D – J**

7.2. Regional Setting

The Geelstert Grid Connection corridor is located within the northern portion and in close proximity to the northern boundary of the Northern Cape Province. The Province is situated in the north-western corner of South Africa and has a land area of 372,889 km^2, therefore occupying approximately 30% of South Africa's land area and making it the largest province in South Africa even though it has the smallest population.

The town of Aggeneys is located to the west of the grid connection corridor and is the closest town. This mining town is largely restricted to service employees of the mining operations in the immediate area. Other towns within the surrounding area include Pella, located ~ 36km to the north, Pofadder, located ~50km to the north-east, Steinkopf, located ~115km to the west, and Springbok, located ~ 104km to the south-west. Aggeneys includes a primary and secondary school, police station, clinic, golf course and tarred airstrip. Aggeneys is located between Pofadder and Springbok in the Khâi-Ma Local Municipality and within the greater Namakwa District Municipality. The Geelstert Grid Connection corridor falls within ward 4 of the Khâi-Ma Local Municipality. A regional map of the grid connection corridor is provided in **Figure 7.1.**

Farming settlements are located within the greater municipal area, which include Dwagga Soutpan, Vrugbaar, Raap-en-Skraap and Klein Pella. The municipal area is characterised by vast tracts of flat, undeveloped land and arid Karoo landscape, with ephemeral rivers, scattered mountainous areas and inselbergs.

Two large mines are located in the Aggeneys area. The Gamsberg Mine is 7km north-east of the grid connection corridor and exploits one of the largest known, undeveloped zinc ore bodies in the world and comprises of an open pit mine and a dedicated processing plant. The Black Mountain Mine is located 6km north-west of the grid connection corridor (north of the Aggeneis Main Transmission Substation (MTS)), adjacent to the town of Aggeneys. The majority of the residents of Aggeneys are predominantly employees of the Black Mountain Mine. The Black Mountain Mine comprises of two underground shafts, known as the Deep and Swartberg shafts, and a processing plant. The mine produces zinc, lead, silver and copper.

Direct access to Aggeneys and the grid connection corridor is via the N14 national road. The N14 separates the town of Aggeneys and a section of the grid connection corridor (the section located to the east of the Aggeneis MTS and on the Remaining Extent of the Farm Bloemhoek 61) with the town located to the north of the N14. The grid connection corridor traverses the N14 near the Aggeneis MTS. The Loop 10 and the Gamoep gravel roads provide direct access to the grid connection corridor and are parallel to the northern (i.e. Loop 10) and the eastern (i.e. Gamoep) boundaries of the grid connection corridor.

The grid connection corridor for the Geelstert Grid Connection is also located within the Northern Strategic Transmission Corridor, a geographical area of strategic importance for the development of large-scale grid connection infrastructure. Existing grid connection infrastructure within the vicinity of the grid connection corridor include the Aries/Aggeneis 400kV, Aggeneis/Paulputs 220kV, Aggeneis/Harib 220kV,

and the Aggeneis/Nama 220kV power lines. The Geelstert Grid Connection corridor runs parallel to the Aries/Aggeneis 400kV.

In terms of Eskom's 2020-2029 Transmission Development Plan (TDP)[18], the following grid connection infrastructure is planned for the Aggeneis MTS:

- Aggeneis/Paulputs 220kV Power Line
  - This project will introduce a second Aggeneis/Paulputs 200kV power line to be built at 400kV.
- Gromis/Nama/Aggeneis 400kV Power Line
  - This project entails the construction of a 400kV power line from the Gromis Substation to the Nama Substation and from the Nama Substation to the Aggeneis MTS to evacuate generated power from renewable energy facilities within the Namaqualand Customer Load Network (CLN).
- Aries and Aggeneis IPP Strengthening
  - These projects will entail the introduction of 400/132kV transformers at the Aries Substation and at the Aggeneis MTS.

[18] http://www.eskom.co.za/Whatweredoing/TransmissionDevelopmentPlan/Documents/TDP%20Report%202019-2029_Final.pdf

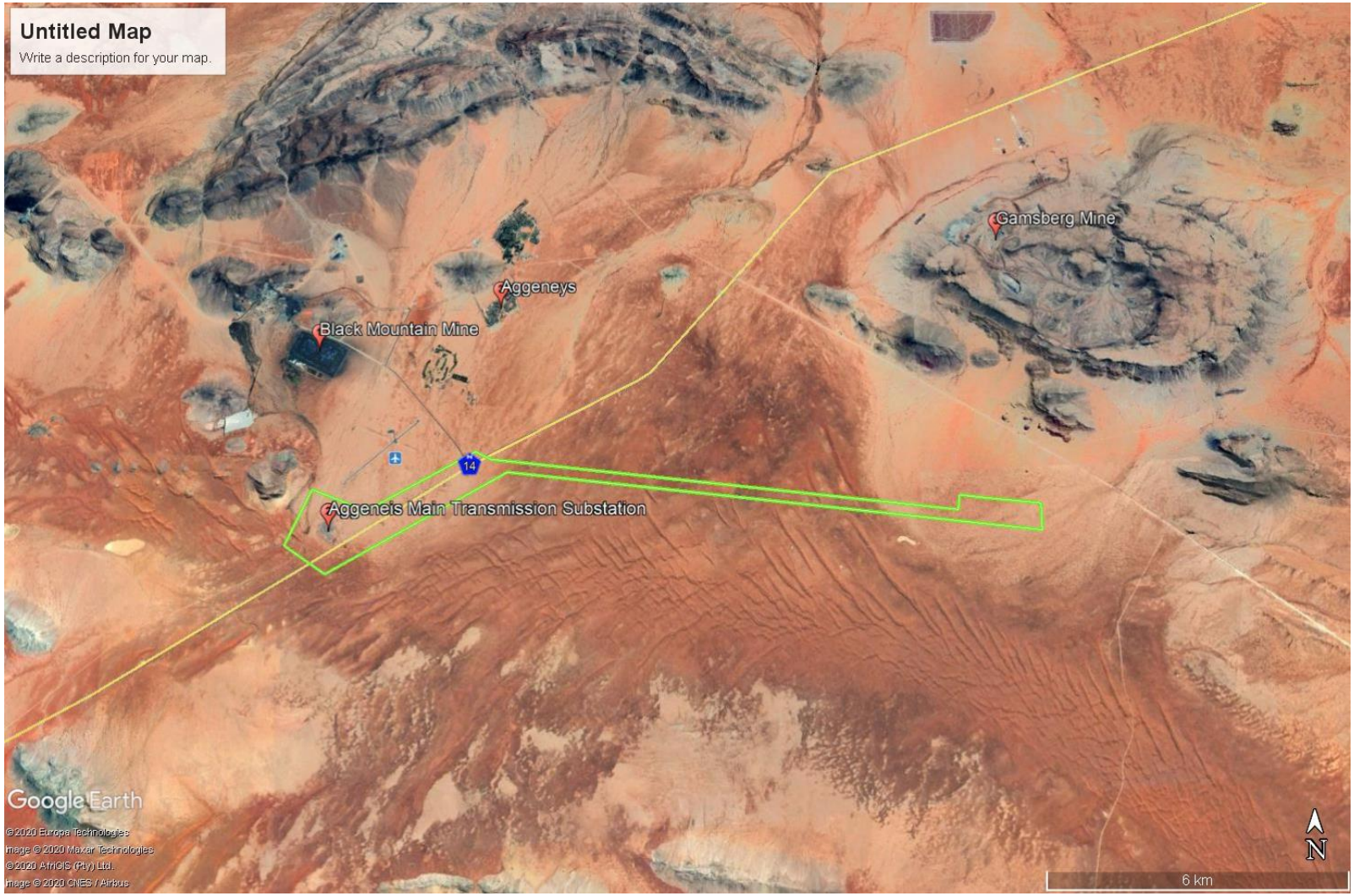

Figure 7.1: A regional map showing the location of the Geelstert Grid Connection corridor relative to the Black Mountain and Gamsberg mines.

7.3. Climatic Conditions

Aggeneys receives about 34mm of rain annually, with most of the rainfall occurring during autumn. The area receives the lowest rainfall (0mm) in December and the highest (9mm) in March. The average midday temperatures for Aggeneys range from 17.7°C in July to 31.6°C in January. The region experiences the lowest temperatures during July when the temperature drops to 3°C on average during the night. Refer to **Figures 7.2.**

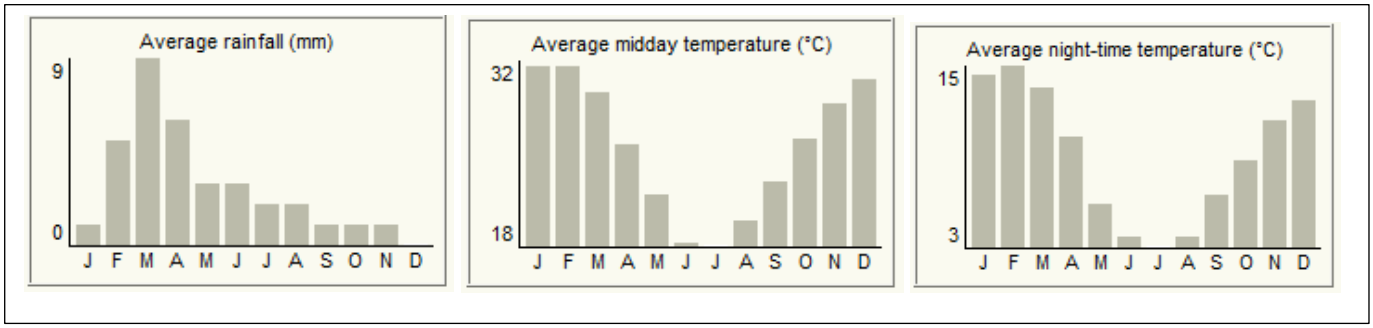

Figure 7.2: Histograms showing the general climatic conditions associated with the Aggeneys area.

7.4. Biophysical Characteristics of the Geelstert Grid Connection Corridor

7.4.1. Topography, Terrain and Land Use

The Geelstert Grid Connection corridor is located south of the Kalahari Basin. The landscape is sparsely vegetated and covered by pale red aeolian sands of the Quaternary Gordonia Formation (Kalahari Group).

The Orange River (Gariep River) flows from south-east to north-west, approximately 37km north and north-west of the grid connection corridor. The Orange River is a major regional river system that receives its source from the mountains on the western edge of Lesotho and is joined by the Vaal which flows into the sea on the West Coast where it forms the border between South Africa and Namibia.

The grid connection corridor is located within a broad valley that drains towards the Orange River. The grid connection corridor is set at an elevation of 840m – 870m above mean sea level (amsl). The valley floor surrounding the grid connection corridor is incised by a number of shallow watercourses that drain towards the Orange River. These watercourses are non-perennial and only run for short periods of time during and after summer and autumn rains. The surface terrain in the region of the grid connection corridor is predominantly sandy to gravelly and traversed by a number of very shallow, intermittently-flowing drainage lines (also known as ephemeral watercourses). The Koa River Palaeovalley traverses that area in a north-west and south-east direction. The grid connection corridor crosses the Koa River Palaeovalley for a distance of approximately 8km on route towards the Aggeneis MTS.

The majority of the grid connection corridor and the surrounding area comprises fairly flat-lying terrain between inselbergs or isolated steep rocky outcrops. The inselbergs in the vicinity of the grid connection corridor are concentrated to the north, north-east and north-west where they form other upper valley slopes and ridgelines. Immediately north of the grid connection corridor are the Aggeneys 1 and Aggeneys 2 solar PV facilities and, the Ghaamsberg rises to approximately 1 100 amsl, albeit this feature is

currently being mined and is the location of the Gamsberg Mine. In addition, there are two isolated areas of rocky outcrop within the valley floor approximately 8km to the south and south-east of the grid connection corridor.

7.4.2. Geology, Soils and Agricultural Potential

i. Geological Setting of the Geelstert Grid Connection corridor

The geology of the Aggeneys region consists of scattered basement inliers on the southern margins of the Gamsberg which are composed of a variety of resistant-weathering igneous and high grade metamorphic rocks - mainly gneisses, schists, quartzites and amphibolites - of Late Precambrian (Mokolian/ Mid-Proterozoic) age. These ancient basement rocks, which underlie the grid connection corridor are assigned to the Namaqua-Natal Province and are approximately one to two billion years old. The flatter portions of the area, including those located within the grid connection corridor, are underlain by a spectrum of mostly unconsolidated superficial sediments of Late Caenozoic age. These include Quaternary to recent sands and gravels of probable braided fluvial (alluvial fan) or sheet wash origin, as well as a veneer of down-wasted surface gravels and colluvial (rocky scree) deposits. The alluvial and colluvial sediments are locally overlain, and perhaps also underlain, by unconsolidated aeolian (i.e. wind-blown) sands of the Gordonia Formation (Kalahari Group) that are Pleistocene to Holocene in age. Orange-hued linear sand dunes with northwest-southeast trending crests are well seen in the Koa River Palaeovalley area. All these superficial sediments can be broadly subsumed into the Late Cretaceous to Recent Kalahari Group.

The Koa River Palaeovalley is an important Caenozoic geological feature in the Aggeneys area and traverses the grid connection corridor. It represents a defunct south bank tributary of the River Orange of Neogene/ Late Tertiary (Miocene – Pliocene) age that fed into the palaeo-Orange River near Henkries. The palaeovalley is marked by intermittent pans and a veneer of orange-brown Kalahari wind-blown sands.

ii. Soils and Agricultural Potential of the Geelstert Grid Connection corridor

The grid connection corridor is underlain by Quaternary sediments, mostly sandy. Dunes also occur in the landscape. The grid connection corridor is covered by two land types, Af21 and Af26, both of which have a high base status with red soils and dunes (refer to **Figure 7.3**).

Table 7.1 below provides the details of the soils and land types present within the grid connection corridor of the Geelstert Grid Connection.

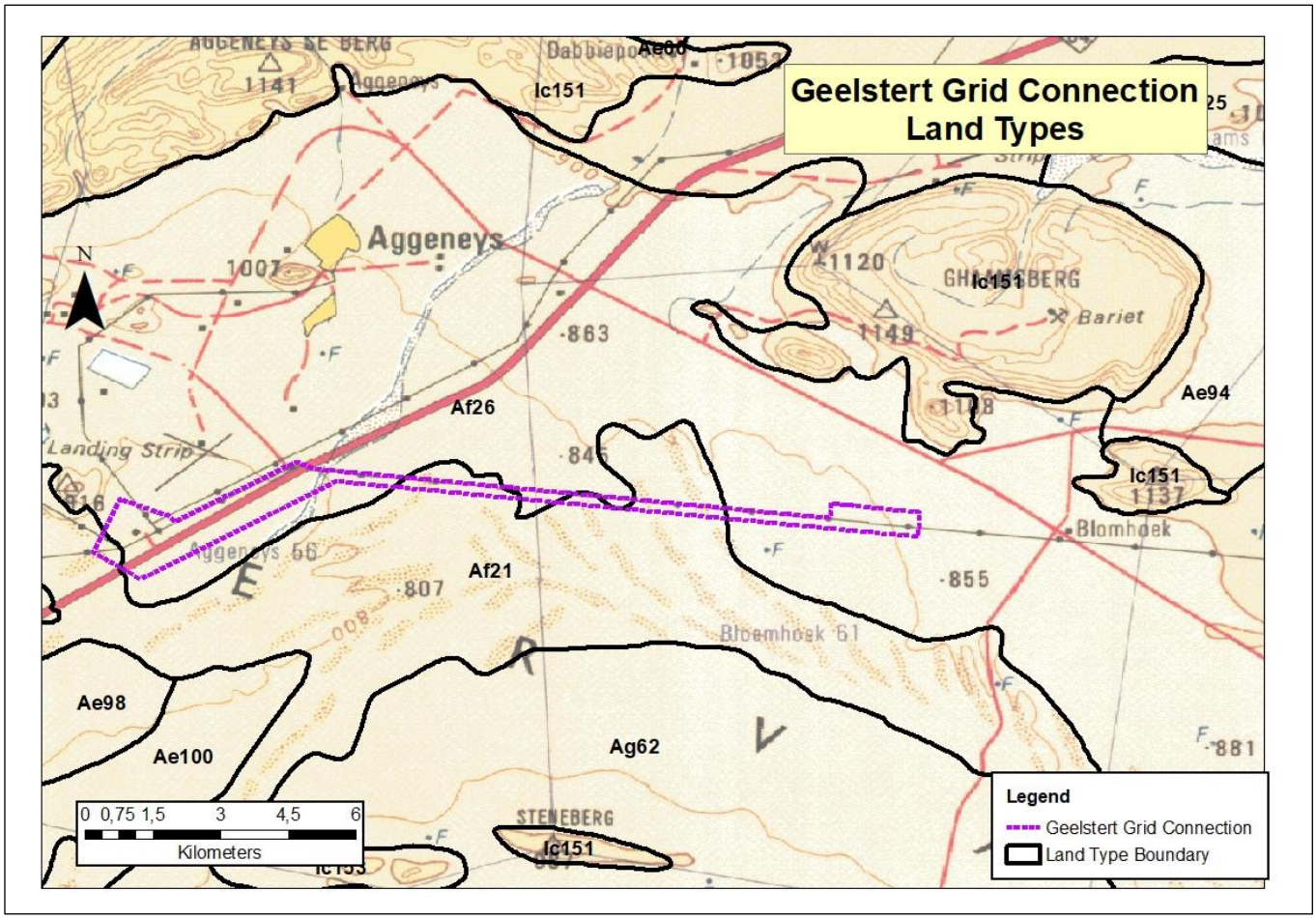

Figure 7.3: Land types present within in the grid connection corridor of the Geelstert Grid Connection.

Table 7.1: Details of the soils and land types present within the grid connection corridor of the Geelstert Grid Connection.

Land Type	Dominant Soils	Depth (mm)	Percent of land type	Characteristics	Agricultural Potential (%)
Af21	Hutton 31	>1200	75%	Red, sandy, structureless dune soils	High: 0.0 Mod: 0.0
	Hutton 32/35	300-700	16%	Red, sandy, structureless soils, on calcrete/dorbank	**Low: 100.0**
Af26	Hutton 30/31	>1200	63%	Red, sandy, structureless soils, occasional dunes	High: 0.0 Mod: 0.0 **Low: 100.0**
	Fernwood 21	>1200	17%	Grey, sandy, structureless soils	

The majority of the grid connection corridor is located within land type Af26, which consists largely of deep, sandy soils. The middle section of the grid connection corridor and the section at the Aggeneis MTS are located within the land type Af21, which consists of red structureless soils that also consist of occasional dunes. As a result of the location of the grid connection corridor at the foot of the inselbergs to the north, much shallower soils are present, with soils classified as belonging to the Garies (orthic topsoil on red

apedal subsoil on cemented dorbank) and Knersvlakte (orthic topsoil on cemented dorbank) forms, with depths of less than 450 mm. Some outcrops of gravel and dorbank are also present at the surface.

No soils with a high agricultural potential are present within the grid connection corridor, with the soils being generally of low potential at best. This is a result of a combination of the shallow depth and the sandy texture which will lead to rapid water infiltration and the soils drying out. In addition, the low rainfall pattern in the area means that there is little potential for rain-fed arable agriculture. Arable production would, therefore, be possible only by irrigation, and no indications of any irrigated areas within, and surrounding the grid connection corridor, is present.

In general, the soils that do occur within the grid connection corridor are suited for extensive grazing at best, however, the grazing capacity is very low, at around 26-40 ha/large stock unit.

The soils present within the grid connection corridor are not considered susceptible to erosion by water. However, if the vegetation cover is disturbed (for example by overgrazing and construction activities) and considering the sandy nature of the topsoil, as well as the dry climate, there is a significant possibility of removal of some or all of the topsoil by wind action.

7.4.3. Ecological Profile of the Geelstert Grid Connection Corridor

i. Broad-Scale Vegetation Patterns

According to the national vegetation map, the grid connection corridor (refer to **Figure 7.4**) is restricted to the Bushmanland Sandy Grassland vegetation type which has a conservation type of Least Concern and the Bushmanland Sandy Grassland. The southern boundary of the development footprint consists of deeper sands and sands of the Bushmanland Sandy Grassland Vegetation type, which characterises the majority of the area making up the Koa River paleovalley. The Boesmanland Vloere is also present within the development area, to the west of the development footprint.

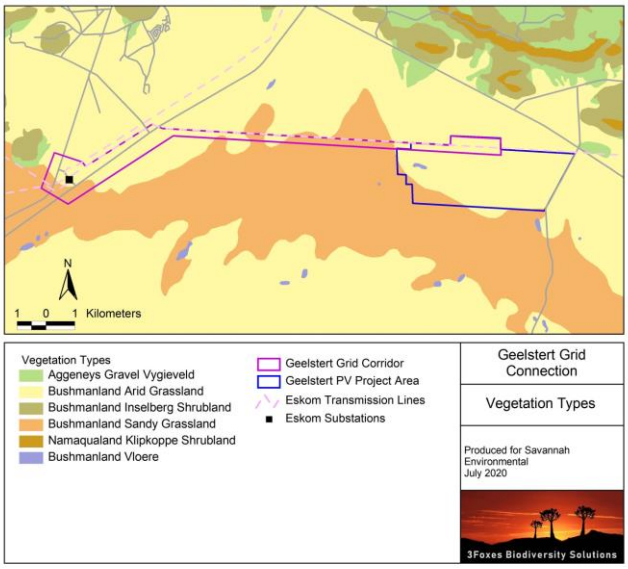

Figure 7.4. Broad-scale overview of the vegetation types within and around the Geelstert Grid Connection corridor.

The Bushmanland Arid Grassland vegetation type is an extensive vegetation type and is the second most extensive vegetation type in South Africa, occupying an area of 45 478 km^2. It is associated largely with red-yellow apedal (without structure), freely drained soils, with a high base status and mostly less than 300mm deep. Due to the arid nature of the unit, which receives between 70mm and 200mm annual rainfall, it has not been significantly impacted by intensive agriculture and more than 99% of the original extent of the vegetation type is still intact. Six (6) endemic species are listed for the vegetation type, which is a relatively low number considering the extensive nature of the vegetation type.

Although there are a variety of other vegetation types in the area, these are outside of the development footprint and would not be directly affected by the development.

ii. Habitats and plant communities

Bushmanland Sandy Grassland

This habitat is located within the central section of the grid connection corridor which crosses the northern extent of the dune habitat associated within the Koa River Palaeovalley. *Dominant species include grasses such as Stipagrostis ciliata, S.brevifolia, Cladoraphis spinosa, Leucophrys mesocoma and Brachiaria glomerata; shrubs such as Phaeoptilum spinosum, Rhigozum trichotomum and Hermannia gariepina and forbs such as Limeum sulcatum, Requienia sphaerosperma, Sesamum capense, Tribulis cristatus, Citrullus lanatus, Asparagus retrofractus and Gisekia pharnacioides var pharnacioides.* This is considered to be a sensitive habitat, as it is generally sensitive to habitat disturbance and is the known habitat of the Red Lark. Although this area is considered to be more sensitive in comparison to the grassy plains, the existing Aries/Aggeneis 400kV power line traverses this habitat and the construction of an additional power line adjacent to the existing power line would require relatively little additional disturbance.

Figure 7.5: A view of the red dune habitat along the central section of the grid connection corridor. This area is generally sensitive to habitat disturbance, however the presence of the existing Aries/Aggeneis 400kV power line through this area renders it acceptable for development.

Bushmanland Arid Grassland on Sandy Plains

Occurs between the deep sands of the Koa River Palaeovalley and the shallow pediments which occur around the base of the Ghaamsberg and the adjacent inselbergs. The pediments are associated with red coarse sands dominated by perennial grasses with scattered shrubs. Dominant species include the grasses *Stipagrostis ciliata*, *S.obtusa*, *S.anomala* and *Aristida adscenionis*, and low woody shrubs such as *Hermannia spinosa*, *Lycium cinereum*, *Salsola rabieana*, *Asparagus capensis*, *Galenia africana*, *Melolobium candicans*, *Eriocephalus spinescens*, *Zygophyllum retrofractum*, *Pteronia glomerata*, *Rhigozum trichotomum* and *Aptosimum spinescens* (refer to **Figure 7.6**). The abundance of listed or protected species within this habitat is low and apart from a low density of *Hoodia gordonii*, no other significant species were observed. As this habitat is widely available in the area, it is not considered sensitive and the development of the affected area would generate low ecological impacts on local fauna and flora.

Figure 7.6: A view of the final section of the grid connection corridor towards the Aggeneis MTS. The vegetation present within this area represents the sandy plains habitat and is dominated by *Stipagrostis ciliata*.

iii. Listed Plant & Protected Species

Although there are a large number of listed and protected plant species known from the wider area, these are associated with specific habitats and vegetation types outside of the development area. The Ghaamsberg, as well as other massifs and hills in the area are generally associated with a high abundance of plant species of conservation concern and these are often associated with the Aggeneys Gravel Vygieveld vegetation type, or other specific habitats such as the quartzite outcrops and the gravel plains. Within the grid connection corridor, these habitats are not present, and species of conservation concern are restricted to more widespread species such as the provincially protected *Boscia foetida subsp. foetdia* and *Hoodia gordonii*. Areas of exposed ferricrete are occasional across the surrounding and frequently contain species of conservation concern as various *Lithops* and *Conophytum*. *Lithops julli subsp fulleri* was identified adjacent to the Loop 10 Road, however the grid connection corridor is located outside of this area.

iv. Critical Biodiversity Areas (CBA) and Broad-Scale Processes

An extract of the Northern Cape Critical Biodiversity Areas (CBAs) map for the grid connection corridor is illustrated below in **Figure 7.7**. The grid connection corridor falls within an Ecological Support Area (ESA), which are areas identified as important buffer areas for CBAs or which may be important for ecological processes such as landscape connectivity. The Koa Palaeoriver Valley associated with the red dune habitat that supports the Red Lark has been classified as a CBA 2. The central section of the grid connection corridor and the existing Aries/Aggeneis 400kV traverse the northern boundary of this feature towards the Aggeneis MTS. In addition, the grid connection corridor further traverses the Haramoep and Black Mountain Important Bird Area (IBA). The footprint of the grid connection infrastructure associated with the Geelstert Grid Connection would however be low and the placement of the infrastructure adjacent to the existing Aries/Aggeneis 400kV power line would reduce the overall impact of grid connection infrastructure in the area.

The Ghaamsberg located to the north of the grid connection corridor is classified as a CBA 1 as a result of the species of conservation concern that are associated with the inselbergs. The grid connection corridor (including the site for the collector substation) is located outside of the CBA 1. The grid connection corridor is located to the south of the CBA 1 and has been separated from this feature by the Loop 10 Road which runs across the area in an east-west direction.

In terms of conservation planning, the two CBAs are regarded as the Northern Cape Expansion Strategy Focus Areas (NC-PAES) and fall within the Kamiesberg-Bushmanland-Augrabies Focus Area (**Figure 7.8**). It is anticipated that the impact of development within these areas would be low given the location of the grid connection corridor parallel to the existing Aries/Aggeneis 400kV power line. As a result, it is not anticipated that the development of the power line would cause a significant loss of habitat within the NC-PAES areas.

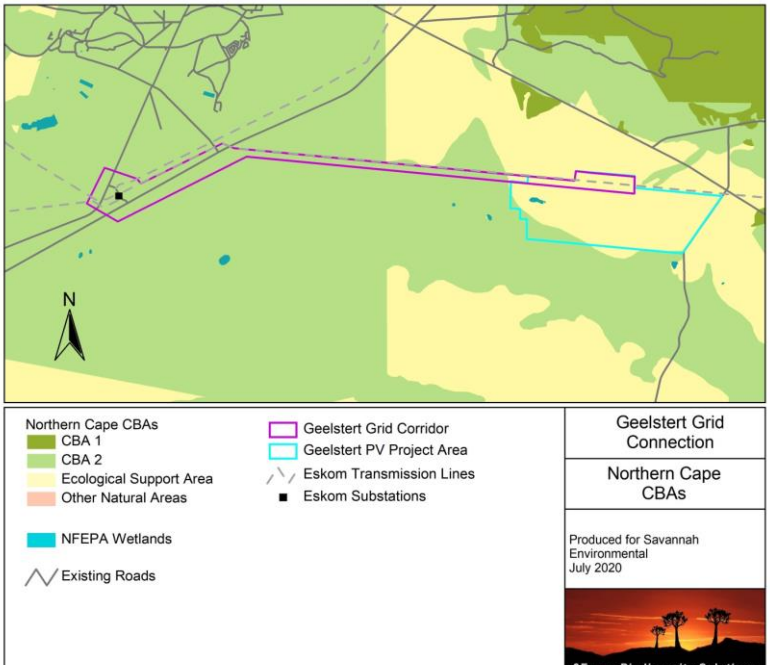

Figure 7.7: An extract of the Northern Cape Critical Biodiversity Area showing the location of the grid connection corridor within the ESA and the CBA 2.

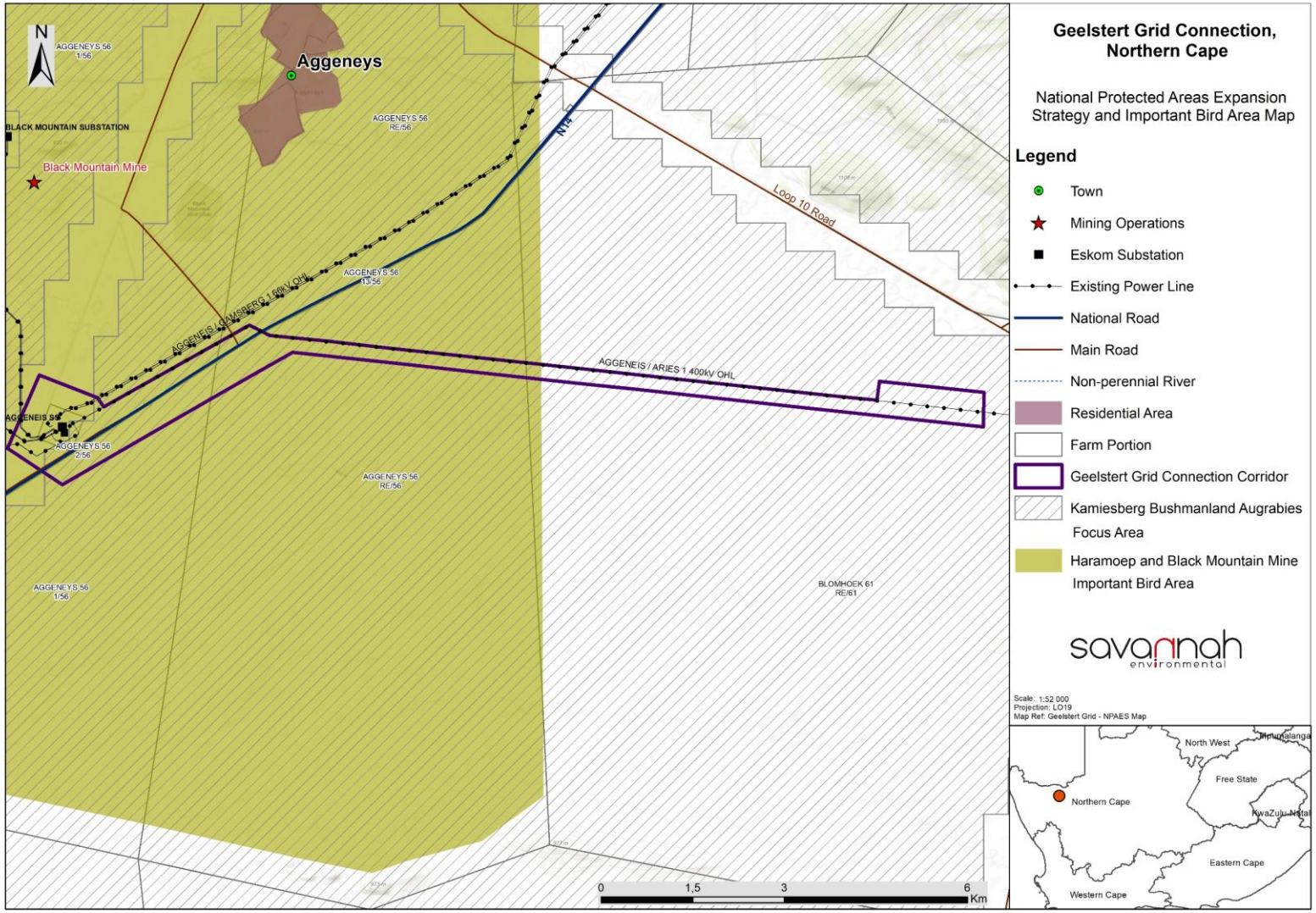

Figure 7.8: A map showing the location of the grid connection corridor within the Haramoep & Black Mountain IBA and the Kamiesberg-Bushmanland Augrabies Focus Area

v. Terrestrial Fauna

Mammals

The mammalian community within the grid connection corridor is likely to be of a moderate to low diversity. Although more than 50 species of terrestrial mammals are known from the wider area, the extent and habitat diversity of the development area is too low to support a very wide range of mammals. Species that can be confirmed present in the area include Caracal, Black-backed Jackal, African Wildcat, Cape Fox, Chacma Baboon, Rock Hyrax, South African Ground Squirrel, Steenbok, Duiker, Springbok, Gemsbok, Cape Porcupine, Yellow Mongoose, Cape Grey Mongoose, Small-spotted Genet, Striped Polecat, Cape Hare, Springhare, Aardvark, Aardwolf and Round-eared Elephant Shrew.

Species associated with the rocky outcrops of the area include Rock Hyrax, Klipspringer, Pygmy Rock Mouse, Namaqua Rock Mouse and Western Rock Elephant Shrew. The open plains which characterise the grid connection corridor are likely to be dominated by species associated with open hard or sandy ground such as various gerbils including the Hairy-footed Gerbil, Cape Hare, Steenbok, Cape Fox, Bat-eared Fox, Aardvark and Aardwolf. There are also burrows of Ground Squirrels and Yellow Mongoose present and these appear to be the most common fauna within the grid connection corridor. There are no areas of particular significance for mammals within the grid connection corridor as the habitat is repetitive and broadly homogenous.

Two listed species may occur in the area, including the Black-footed Cat *Felis nigripes* (Vulnerable) and Leopard *Panthera pardus* (Vulnerable). Given the extremely low cover within the grid connection corridor, it is not likely that Leopard are present within the affected area. The habitat is however broadly suitable for the Black-footed Cat, which favours a mix of open and more densely vegetated areas. This species is however widely distributed.

Reptiles

Although reptile diversity in the surrounding area is high with as many as 60 species known from the area, only a fraction of these are likely to be present within the grid connection corridor. A large proportion of the reptiles of the area consist of species associated with the inselbergs and rocky hills along the Orange River and would not occur on the open plain's characteristic of the grid connection corridor. More typical plains species are likely to dominate the surrounding area such as Verrox's Tent Tortoise *Psammobates tentorius verroxii*, Namaqua Sand Lizard *Pedioplanis namaquensis*, Spotted Desert Lizard *Meroles suborbitalis*, Southern Rock *Agama Agama atra* and Plain Sand Lizard *Pedioplanis inornata*.

Amphibians

Only eight frog species are known from the surrounding area and even this is a gross overestimate of the number of amphibian species likely to be present. There are only a few freshwater features present within the grid connection corridor and only species able to live independently of water will be present. As such the only species likely to be present within the study area would be the Karoo Toad *Vandijkophrynus gariepensis*.

vi. Avifauna

Avian Microhabitats

Two avifaunal microhabitats were identified within the grid connection corridor and are directly associated with two vegetation types. The Bushmanland Arid Grassland vegetation type represents the plains habitat, while the Bushmanland Sandy Grassland represents the dune habitat. The plains habitat (**Figure 7.9**) occurs across much of the grid connection corridor around the site earmarked for the development of the collector substation and at the Aggeneis MTS. The plains habitat is approximately present for half the grid connection corridor length. The dune habitat (**Figure 7.10**) is restricted to the middle section of the grid connection corridor which represents the northern margin/boundary of the Koa River Palaeovalley and supports the Red Lark. This habitat is also associated with the depression wetlands that functions as sources of food for avifauna within the area.

Figure 7.9: The is typical of the area around the site for the development of the collector substation, the solar PV facilities and the Aggeneis MTS. At least half of the length of the grid connection corridor is located within this habitat.

Figure 7.10: A view of the dune habitat which comprise the middle section of the grid connection corridor and supports the Red Lark.

Species Diversity

The bird assemblage recorded within the vicinity of the grid connection corridor is typical of the Nama-Karoo bioregion. An approximate total of 105 bird species have been recorded within the area and surrounds, of which 54 species were observed. Eight of these are Red-listed while a further four are Near-threatened. One species (Red Lark) is endemic to South Africa, while fourteen species are near-endemic. Twelve species are listed as biome-restricted, which include a number of lark species in particular. Numerous others that have been recorded are arid-zone species, which follow either resident or nomadic life strategies.

A total of 38 bird species were recorded, during the transect surveys of 2018, 2019 and 2020 which occurred over two seasons, with 31 species recorded in the winter and 28 species recorded in the summer. Significantly more species and birds were detected in winter compared to summer, with the total bird abundance being five times greater. The veld conditions were extremely dry and harsh during the winter survey, owing to very poor rainfall which resulted in a low number of birds being recorded. This illustrates the extremes in bird abundances that occur within the area depending on local conditions and the corresponding response by nomadic bird species.

The four most abundant species recorded during winter were all highly nomadic passerine species, of which the most abundant was the Grey-backed Sparrow-lark *Eremopterix verticalis*, with 10.8 birds/km being detected. These highly nomadic species are known to respond to rainfall events, becoming entirely absent again during unfavourably dry periods. The second and third most abundant species were Lark-like Bunting *Emberiza impetuani* and Stark's Lark *Spizocorys starki*, with 4.5 and 4.1 birds/km, respectively. The fourth most abundant species was the Black-eared Sparrow-lark *Eremopterix australis*, with 2.8 birds/km detected. All these species exhibited dramatically reduced numbers during the summer survey.

The Red Lark was detected at a rate of 0.53 birds/km in winter and 0.68 birds/km in summer, although considering that it was only recorded in the dune and not within the plains habitat, this relative abundance is rather unrepresentative of the species. In winter (2018) Red Larks were recorded on six (6) of the 30 transects, with a total of 16 sightings, and exclusively within the dune habitat and adjacent sandy flats characterised by red sands, tall grasses, and interspersed tall shrubs. In summer, Red Larks were recorded on seven (7) of the 19 transects (12 sightings), all within the same dune habitat as in winter. This suggests that the species is common within the dune habitat, but mainly absent from the plains habitat of the grid connection corridor.

Red-listed species

A total of nine red-listed non-passerine species have been reported for the area during SABAP 1 and the SABAP 2 period. Of these, seven are listed as threatened and two as Near-Threatened. The most important of these include Martial Eagle *Polemaetus bellicosus* (Endangered), Ludwig's Bustard (Endangered) and Verreaux's Eagle *Aquila verreauxii* (Vulnerable), all of which are considered to have local populations of moderate importance. Ludwigs's Bustard and Martial Eagle were both seen foraging within the area, while Verreaux's Eagle was seen directly adjacent to the grid connection corridor. An adult Martial Eagle was also seen roosting on the pylon structure of the Aries/Aggeneis 400kV power line during both the winter and summer field surveys. Two separate Martial Eagle nests were located on pylons to the north and east of the grid connection corridor. The Martial Eagle nest to the north of the grid connection corridor was active with birds recorded nesting during the June 2020 field survey. In addition, a Secretarybird nest is located approximately 1.5km south of the grid connection corridor (**Figure 7.11**).

Figure 7.11: Location of the two Martial Eagle nests (orange markers) in relation to the Geelstert Grid Connection corridor. The Martial Eagle nest to the north of the grid connection corridor was found to be active, with birds nesting during the June 2020 field survey. The nest to the east of the grid connection corridor appeared derelict and unattended. One Secretarybird nest (blue marker) is located to the south of the grid connection corridor within the dune habitat.

vii. Freshwater Features

The grid connection corridor identified for the development of the Geelstert Grid Connection is located within the Quaternary Catchment Area D82C and within the Orange Water Management Area (WMA). A review of the National Freshwater Ecosystem Priority Area (NFEPA) coverage of the grid connection corridor and the surrounding environment showed that no FEPAs were present within the grid connection corridor. The most prominent freshwater feature within the surrounding area of the grid connection corridor is an endorheic, ephemeral watercourse located approximately 8km north-west of the grid connection corridor (**Figure 7.12**). This watercourse drains in a north-west direction and has been classified as a Lowland River and is considered to be 'largely natural' (Class B) in terms of the Present Ecological Study (PES).

Numerous small depression wetlands have been identified within the vicinity of the grid connection corridor (**Figure 7.13**). Three depression wetlands are located within the grid connection corridor whilst two are located in close proximity to the grid connection corridor and a section of the grid connection corridor will encroach on the catchment areas of these wetlands. The five depression wetlands share similar geomorphological characteristics and range in size between 1 266m^2 and 38 941m^2 with an average size of 17 343m^2. The wetlands vary in shape between an oval to kidney-like shape (**Figure 7.13**) and are largely endorheic (isolated from other surface water ecosystems). They have limited to no direct connection with groundwater and tend to be recharged by unchanelled overland flow and interflow following significant rainfall events in the area.

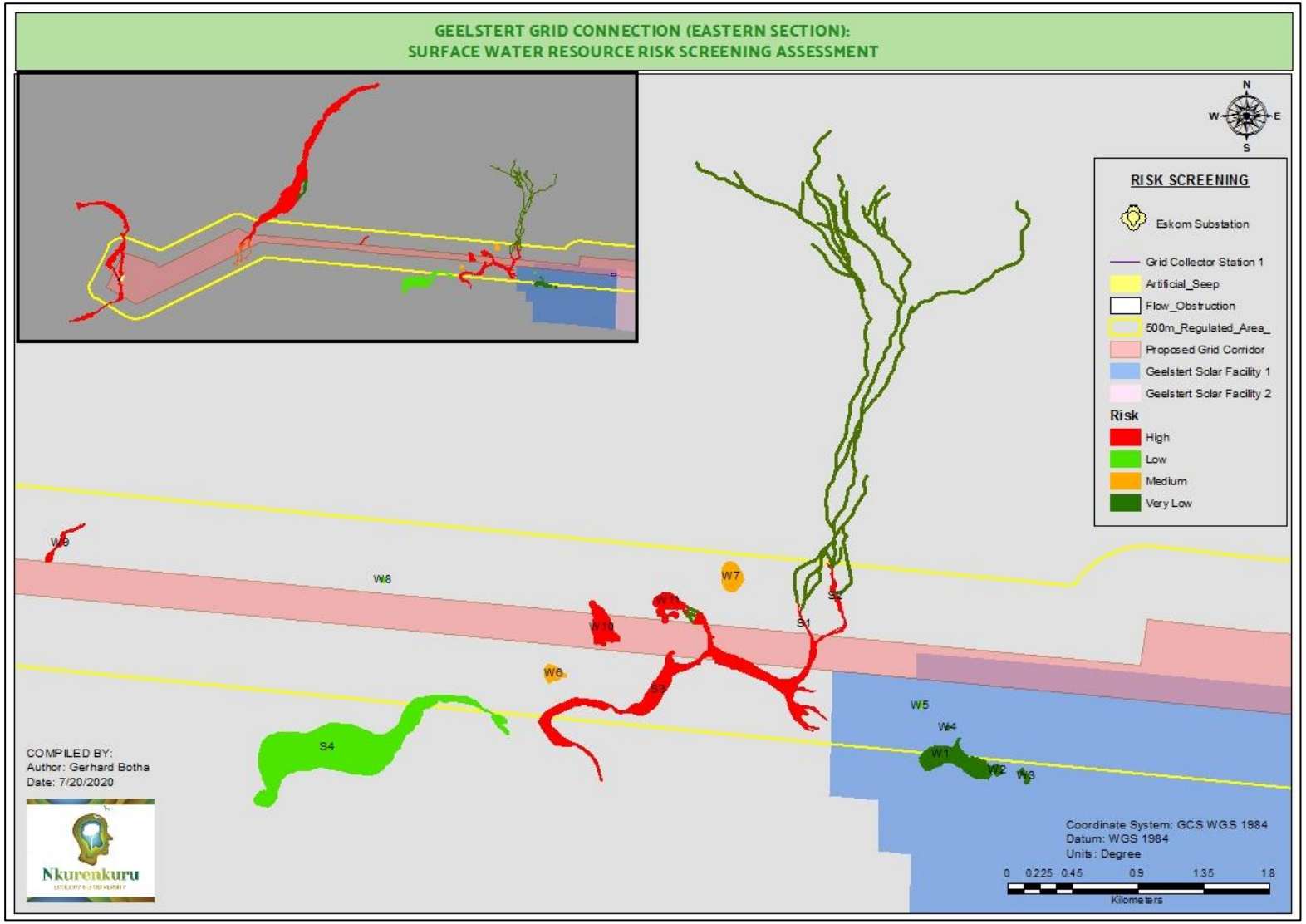

Figure 7.12: A showing the freshwater features identified within the grid connection corridor near the development area for Geelstert 1.

The depression wetlands consist of similar soil types and consist largely of an orthic A-horizon and a faded E-horizon. The dominant soil type for the depression wetlands is the Fernwood soil type. The central portions of the depression wetlands are typically devoid of vegetation (refer to **Figure 7.13**) as a result of the high saline properties associated with the soils in the area, however sparse shrubs of *Lycium cinereum* and *Stipagrostis ciliata* are found on the peripheries of these features. Other species that are associated with the peripheries of the wetlands include, *Rhigozum trichotomum, S. uniplumis* and *Arctotheca calendula.*

Figure 7.13: Photographs showing the sparse vegetation (albeit shrubs are associated with the peripheries of the depression wetlands) associated with the depression wetlands located within the grid connection corridor for the Geelstert Grid Connection and the existing Aries/Aggeneis 400kV Power Line.

Seven ephemeral watercourses that lack distinct channel features were identified within the vicinity of the grid connection corridor and are described as Lower Foothill Rivers in terms of the National Classification System. These ephemeral watercourses generally dissipate into a sea of sand within the area; however, others tend to show a braided channel configuration, which is associated with a *bar* and *swale* topography (refer to **Figure 7.14**). In addition, smaller ephemeral watercourses which largely have been impacted by livestock grazing are located upstream and outside of the grid connection corridor to the east. Some of these smaller ephemeral watercourses have their reaches located within the grid connection corridor; however, they will be spanned by the grid connection infrastructure (i.e. power line pylons/towers, etc.) during the construction phase.

The ephemeral watercourses are dominated by *Stipagrostis namaquensis* with some *S. ciliata*. Other plant species present within the ephemeral watercourses include, *Dimorphotheca pluvialis, Aptosimum spinosum, Lycium cinerum, Hermania spp* and *Cotula pedicellata.* The banks of the ephemeral watercourses are dominated by *S.ciliata* and *Lycium cinereum.*

Figure 7.14: Photographs showing the ephemeral watercourses identified within and within the vicinity of the Geelstert Grid Connection corridor. The ephemeral watercourses generally dissipate into a sea of sand within the area and are associated with plant species such as *S.ciliata* and *Stipagrostis namaquensis*.

7.5. Integrated Heritage including Archaeology, Palaeontology and the Cultural Landscape

7.5.1. Heritage and the cultural landscape

The general area is dominated by heritage associated with copper mining activities, including the nearby Black Mountain Mine which is still being mined for copper deposits to date. Prior to 1652, the Khoisan and Nama people from the area extracted raw or native copper from the gneiss and granite hills that make up the surrounding Namaqualand Copper Belt. This copper was beaten into decorative items, which were also worn as bangles and neck adornments. Other heritage resources known from the area include, corbelled buildings and other structures associated with the colonial frontier. Based on the information available, no such structures are located within the grid connection corridor for the Geelstert Grid Connection.

7.5.2. Archaeology

Prior to colonial settlement, the Aggeneys area was occupied by the Khoe and San people as evidenced by the number of Khoe and San names still evident in the area such as Aggeneys. Archaeological resources known from this area include Early Stone Age (ESA) and Middle Stone Age (MSA) resources that occur in lower densities. All known archaeological resources from the area are associated with the sand dunes and the outcrops. MSA stone artefact scatters are sparsely distributed across the surrounding area and are typically found on gravel pavements between the vegetation. In general, the grid connection corridor and the surrounding area lacks discrete archaeological sites and there are no buildings of heritage significance known from the area.

7.5.3. Palaeontology

The Geelstert Grid Connection corridor is overlain with Quaternary cover sands associated with a low palaeontological sensitivity and is underlain by granites of the Koeipoort Formation and quartzites of the Wortel Formation. The surrounding area has been subject to numerous palaeontological impact assessments and the outcomes of these assessments have shown that the general area is also associated with Mid-Proterozoic (Mokolian) basement rocks of the Namaqua-Natal Metamorphic Province, as well as Cenozoic superficial deposits. The Proterozoic granite-gneiss basement rocks of the Namaqua-Natal Metamorphic Province do not contain any fossils because these rocks are igneous in origin or too highly metamorphosed. In addition, the Cenozoic superficial deposits are associated with a low palaeontological potential due to the scarcity of fossils within these deposits within the area.

7.6. Visual Quality

i. Landscape Character

Landscape character is defined as "a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another". The landscape surrounding the development area is arid, comprising relatively flat drainage plains with inselbergs or rocky outliers such as the Aggeneys Mountains, Black Mountain and Ghaamsberg rising above wide plains. Areas to the south of the grid connection corridor appear relatively natural, while to the north, east and west there are extensive areas of mining such as the Gamsberg and Black Mountain mines. The Gamsberg Mine is located 7km north-east of the grid connection corridor and the Black Mountain Mine 6km north-west (at the Aggeneis Main Transmission Substation) of the grid connection corridor. The town of Aggeneys is located to the north of the grid connection corridor.

Landscape Character is a composite of several influencing factors including:

- Landform and drainage.
- Nature and density of development; and
- Vegetation patterns.

Landform and drainage

Most of the grid connection corridor comprises fairly flat-lying terrain between inselbergs or isolated steep rocky outcrops. The inselbergs in the vicinity of the grid connection corridor are concentrated to the north, north-east, and north-west, where they form the upper valley slopes and ridgelines. To the north and north-west, a large rocky outcrop (Ghaamsberg) rises to approximately 1 100m amsl. There are also two isolated areas of rocky outcrop within the valley floor to the south of the grid connection corridor.

Nature of development and land uses

The landcover can be divided into the following types:

- Natural Area
  - The main landcover surrounding the grid connection corridor is a natural area. This area is likely to be used largely for stock rearing and low intensity grazing. As this has not resulted in mass clearance of vegetation, much of the area retains a relatively natural appearance. Situated

within this landcover are occasional homesteads that are scattered sparsely throughout the area. The low density of development is no doubt a product of the low agricultural potential / carrying capacity of the area.

- Urban development
  - Urban development in the small town of Aggeneys, includes housing, sports grounds, and commercial uses. Particularly within the well-established areas of these settlements, streets are relatively broad and are lined with street trees. Gardens generally have mature woody ornamental plants. The density of development and the extent of vegetation is likely to serve to screen most external views from the urban area.
- Degraded Areas
  - Degraded areas are also evident and appear to be associated with mining activities.
- Mining Developments
  - Include the Black Mountain Mine and the Gamsberg Mine that are underground and open cast mining operations located to the west and north-east of the proposed development. The Gamsberg Mine is located 7km north-east of the grid connection corridor. The Black Mountain Mine is located directly to the south of the town of Aggeneys and 15km west of the grid connection corridor.

Vegetation Patterns

The majority of the landscape is covered by low sparse grass and herbaceous vegetation. During much of the year this vegetation lies dormant and is brown due to lack of water. However, during Summer and Autumn rains, the landscape rapidly becomes green and colourful as plants use this period to regenerate and reproduce.

While there are obvious botanical differences, in terms of visual considerations all vegetation types are relatively low in nature and are comprised largely of grass species. They are, therefore, unlikely to provide significant visual absorption capacity (VAC) and will contribute to an open landscape character within which long distance views are possible.

The uniformity of the vegetation cover and its transformation after rain is a major constituent of the current landscape character. Major disturbance of this could have implications for landscape character.

In addition, taller woody vegetation occurs in limited areas such as the town of Aggeneys where dense tree and shrub planting has occurred around houses and on the town's golf course.

ii. Visual Receptors

Visual Receptors are defined as "individuals and / or defined groups of people who have the potential to be affected by the proposal".

- Area receptors
  - Within the vicinity of the grid connection corridor, the only potential area receptor is the urban area of Aggeneys. Areas associated with this use are likely to be the most sensitive to possible changes in the views of the surrounding landscape, which will be associated with the development of the grid connection infrastructure. However, due to the already highly industrialised landscape around the settlement associated with mining activities in the area, it is

unlikely that residents would object to the project unless the development is likely to significantly increase existing impacts.

- Linear receptors
  - The N14 national road is adjacent to the grid connection corridor. Because this route carries a high proportion of recreational and tourism related traffic, it is considered sensitive to potential change in views of the surrounding landscape as a result of the proposed development.
  - The Loop 10 gravel road runs parallel to the northern boundary of the grid connection corridor. This road joins the N14 approximately 8km north-west of the proposed Geelstert Collector Substation. While it is un-surfaced, it serves as the only east–west route in the region, linking a number of regional routes all of which run in a general north–south direction. This road runs for more than 200km, however there appears to be few settlements or farmsteads that are served by it. It is likely that it is used mainly by local people and mining operators. It may also possibly be used by more adventure minded tourists.
  - The Gamoep Road (R358) lies to the east of the grid connection corridor and is approximately 3km from the proposed location of the Geelstert Collector Substation. This road is mainly used by local people and mining operators in the area.
- Point Receptors
  - Two homesteads have been identified within the Approximate Limit of Visibility of the Geelstert Grid Connection corridor. These homesteads are likely to be used by livestock farmers, who will probably be more concerned with the productivity of the land rather than their views. However, should either of these homesteads end up being tourist sites, this will increase the sensitivity of the landscape to change. The closest homestead to the grid connection corridor is approximately 2.7km to the east.

7.7 Traffic Conditions

The Loop 10 Road and the Gamoep Road (R358) provide direct access to the Geelstert Grid Connection corridor. The Loop 10 Road provides access to the mining operations of the Gamsberg Mine which is located to the north of the grid connection corridor within the Ghaamsberg. The Loop 10 Road intersects with the N14, approximately 8km north-west of the proposed Geelstert Collector Substation. The Loop10/N14 intersection has recently been upgraded to a blacktop surfacing through the maintenance contract of the N14. The Gamoep Road (R358) intersects with the Loop 10 Road approximately 3km north-east of the proposed Geelstert Collector Substation and provides direct access to the grid connection corridor.

In general, the Loop 10 and Gamoep (R358) roads are formal gravel roads with formal drainage provisions and are associated with soft conditions. However, with stabilisation the roads should be adequate to carry the low daily traffic load volumes in the area with regular maintenance.

7.8 Social Context

The Geelstert Grid Connection is located within the Khâi-Ma Non-Urban (NU) area and has a population of 2 148 people and a population density of 0.14/km². Land uses within close proximity to the corridor includes the Black Mountain Mine, the Gamsberg Mine, the Aggeneys Aerodrome, the residential area of Aggeneys, the N14 national road and livestock farming activities associated with the surrounding areas. There are no major social receptors located within or directly adjacent to the grid connection corridor. Social receptors that could be affected are the local travellers making use of the N14 and surrounding

gravel roads. Other social receptors include the settlements surrounding the grid connection corridor, as well as the agricultural activities including livestock grazing. Due to the fact that renewable energy facilities and associated grid connection infrastructure has been authorised within surrounding area from these social receptors, the development of the Geelstert Grid Connection will not introduce grid connection infrastructure as a new land use to the area.

Apart from the Black Mountain Mine Golf Course, very limited tourism/leisure activities are available within the Aggeneys area. Other tourism facilities outside of the Aggeneys area include the Amam Melkbos Campsite which is located 50km north-west and the Klein-Pella Campsite located 34km north-east of the grid connection corridor.

Table 7.2 provides a baseline summary of the socio-economic profile of the Khâi-Ma LM within which the Geelstert Grid Connection is proposed. The data presented in this section have been derived from the 2011 Census, the Local Government Handbook South Africa 2019, the Northern Cape Provincial Spatial Development Framework (PSDF), and the Integrated Development Plans of the Namakwa DM and Khâi-Ma LM[19].

Table 7.2: Baseline description of the socio-economic characteristics of the area proposed for the Geelstert Grid Connection

Location characteristics
» The project is proposed within the Northern Cape Province, which is South Africa's largest, but least populated Province.
» The project is proposed within the Khâi-Ma LM and the Namakwa DM.
» The Khâi-Ma LM covers an area of land 15 715km² in extent.
Population characteristics
» The Khâi-Ma LM has a total population of 12 465 with a growth rate of 0.83%.
» In terms of the age structure 22.2% of the population is under 15 years of age, 71.6% of the population falls between 15 and 64, with 6.2% of the population being over 65.
» The Khâi-Ma LM is male dominated, with males comprising approximately 52.6% of the LM population, while the Namakwa DM is female dominated, with females comprising approximately 50.3% of the DM population.
» Coloureds comprise the predominant population group within the Khâi-Ma LM and Namakwa DM.
» Within the Khâi-Ma LM 88.1% of the population is coloured, 2.7% is black African, 8.1% is white and 0.9% is Indian/Asian.
» The dominant language spoken in the Khâi-Ma LM is Afrikaans at 96.6%. The remaining spoken languages in the area includes English (0.8%), IsiXhosa (0.9%), IsiZulu (0.2%), Setswana (0.6%) and others (0.8%).
» The Khâi-Ma LM, Namakwa DM, and Northern Cape provincial, and South African national population age structures are all youth dominated. A considerable proportion of the respective populations therefore comprise individuals within the economically active population between the ages of 15 and 64 years of age
Economic, education and household characteristics
» The Khâi-Ma LM has a dependency ratio of 39.6, which correlates to some extent with the Namakwa DM (47.1),

[19] While information was derived from the Local Government Handbook South Africa 2019, Northern Cape PSDF, Namakwa DM and Khâi-Ma LM IDP, these sources largely make use of statistical information derived from the Census 2011. The information presented in this Chapter may therefore be somewhat outdated but is considered sufficient for the purposes of this assessment (i.e. to provide an overview of the socio-economic characteristics against which impacts can be identified and their significance assessed).

Northern Cape Province (35.8), and South Africa (34.5).

- Education levels within the Khâi-Ma LM are low with approximately 22.2% of the population over 20 years of age not having completed Grade 12 / Matric. This means that the majority of the population can be expected to have a relatively low-skill level and would either require employment in low-skill sectors, or skills development opportunities in order to improve the skills level of the area.
- The unemployment rate of the Khâi-Ma LM is high which places strain on the municipal services delivery as people cannot afford to pay for municipal services. In 2011 it was found that 77% of residents receive subsidies from government for their basic services. The unemployment rate of the Namakwa DM is 20.1%.
- In 2011, the unemployment rate was highest across the Northern Cape at 27.4% and lowest across the Namakwa DM at 20.1%. The Khâi-Ma LM had an unemployment rate of 22.1% over the same period. Regarding youth unemployment, at 34.5%, it is highest across the Province and lowest within the Khâi-Ma LM at a rate of 23.6%.
- The Namakwa DM has approximately 40% females as household heads and approximately 62% male household heads while having around 0.25% household heads under the age of 18.
- The primary economic activities within the Khâi-Ma LM comprise agriculture, tourism, community, social and personal services.
- The majority of households within the Khâi-Ma LM comprise formal dwellings (92.4%) and the average household size is 3.

Services

- The two hospitals are available within the Namakwa DM which includes the Abraham Esau Hospital in Calvinia and the Dr Van Niekerk Hospital in Springbok. No hospitals are located within the Khâi-Ma LM.
- The majority of households within the Khâi-Ma LM are well serviced with regards to flush toilets connected to sewage, refuse removal, piped water and electricity, with the LM often exhibiting similar levels of service provision than that of the Namakwa DM.

CHAPTER 8: ASSESSMENT OF IMPACTS

This chapter serves to assess the significance of the positive and negative environmental impacts (direct and indirect) expected for the Geelstert Grid Connection.

This assessment of impacts has considered the construction and operation of the grid connection infrastructure within a 1km wide (extending to 2km at the Aggeneis Main Transmission Substation (MTS)) and 17.5km long grid connection corridor. The grid connection infrastructure will comprise the following key infrastructure and components:

- A new Collector Substation/Switching Station of up to 1.25ha in extent, including:
  - Construction of a new platform with earth mat and civil works.
  - New feeder bay/s and busbar/s (up to 220kV) complete with protection equipment.
- A double-circuit power line of up to 220kV between the existing Aggeneis MTS and the Geelsert Collector Substation, complete with structures, foundations, conductor, fibre layout, insulation and assemblies.
- A 6m wide access road to access the Geelstert Collector Substation and 4m wide jeep tracks to provide access to and along the power line servitude.
- A single-circuit power line (of up to 220kV) to connect the authorised Aggeneys 1 and Aggeneys 2 Collector Substations to the proposed Geelstert Collector Substation, including a 6m wide access road along this power line.
- Works within the Aggeneis MTS HV yard:
  - Establish new feeder bay/s (up to 220kV), inclusive of line bays, busbars, bussection and protection equipment.
  - Install a new transformer (up to 500MVA 400kV/132kV).

Only one technically feasible grid connection corridor to connect the Geelstert 1 and Geelstert 2 solar PV facilities[20] to the Aggeneis MTS was identified (as discussed in **Chapter 3** of this final BA Report). As a result, no grid connection corridor alternatives are considered or assessed in this final BA Report.

The full extent of the grid connection corridor (including the associated infrastructure) (refer to **Figure 8.1**) was considered and assessed through the specialist assessments undertaken as part of this BA process, as well as within this final BA Report. The grid connection infrastructure will be appropriately sited within the grid connection corridor through the consideration of the sensitive environmental features present.

[20] The grid connection infrastructure for the Geelstert Grid Connection will also connect the authorised Aggeneys 1 and Aggeneys 2 Collector Substations to the Geelstert Collector Substation, which will then connect all four project to the Aggeneis MTS.

The development of the grid connection infrastructure for the Geelstert Grid Connection will comprise the following phases:

» ***Pre-Construction and Construction*** – will include pre-construction surveys; site preparation; establishment of access roads (where required), laydown area; construction of foundations involving excavations; the transportation of components/construction equipment to site, manoeuvring and operating vehicles for unloading and installation of equipment; the construction of the collector substation and power line infrastructure; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase for the grid connection infrastructure is estimated to be up to 12 months.

» ***Operation*** – will include the operation of the Geelstert Collector Substation; a double-circuit power line of up to 220kV to connect the Geelstert Collector Substation to the Aggeneis MTS; and the single-circuit power line of up to 220kV to connect the authorised Aggeneys 1 and Aggeneys 2 Collector substations to the Geelstert Collector Substation. The Geelstert Collector Station and power line of up to 220kV will enable the evacuation of electricity from the Geelstert 1 and Geelstert 2 solar PV facilities into the national grid. The operation phase of the Geelstert Grid Connection is expected to be approximately 20 years, with maintenance. The grid connection infrastructure will be handed over to Eskom to operate and maintain as part of the operation phase for the project.

» ***Decommissioning*** – Decommissioning activities for the project will include site preparation, disassembling of the components of the grid connection infrastructure, clearance of the relevant infrastructure at the Geelstert Collector Substation and along the power line servitude, and rehabilitation of the cleared areas. The impacts anticipated for the decommissioning phase are similar to those associated with the construction phase; however, in certain instances the specialists have identified and assessed specific decommissioning impacts for the project. These impacts have been included as separate impacts where relevant in this Chapter. Depending on the economic viability of the Geelstert 1 and Geelstert 2 solar PV facilities and Eskom's plans for the grid connection infrastructure (i.e. the power lines and the Geelstert Collector Substation, etc.), the length of the operation phase of the grid connection infrastructure may be extended beyond the anticipated 20-year period operation phase.

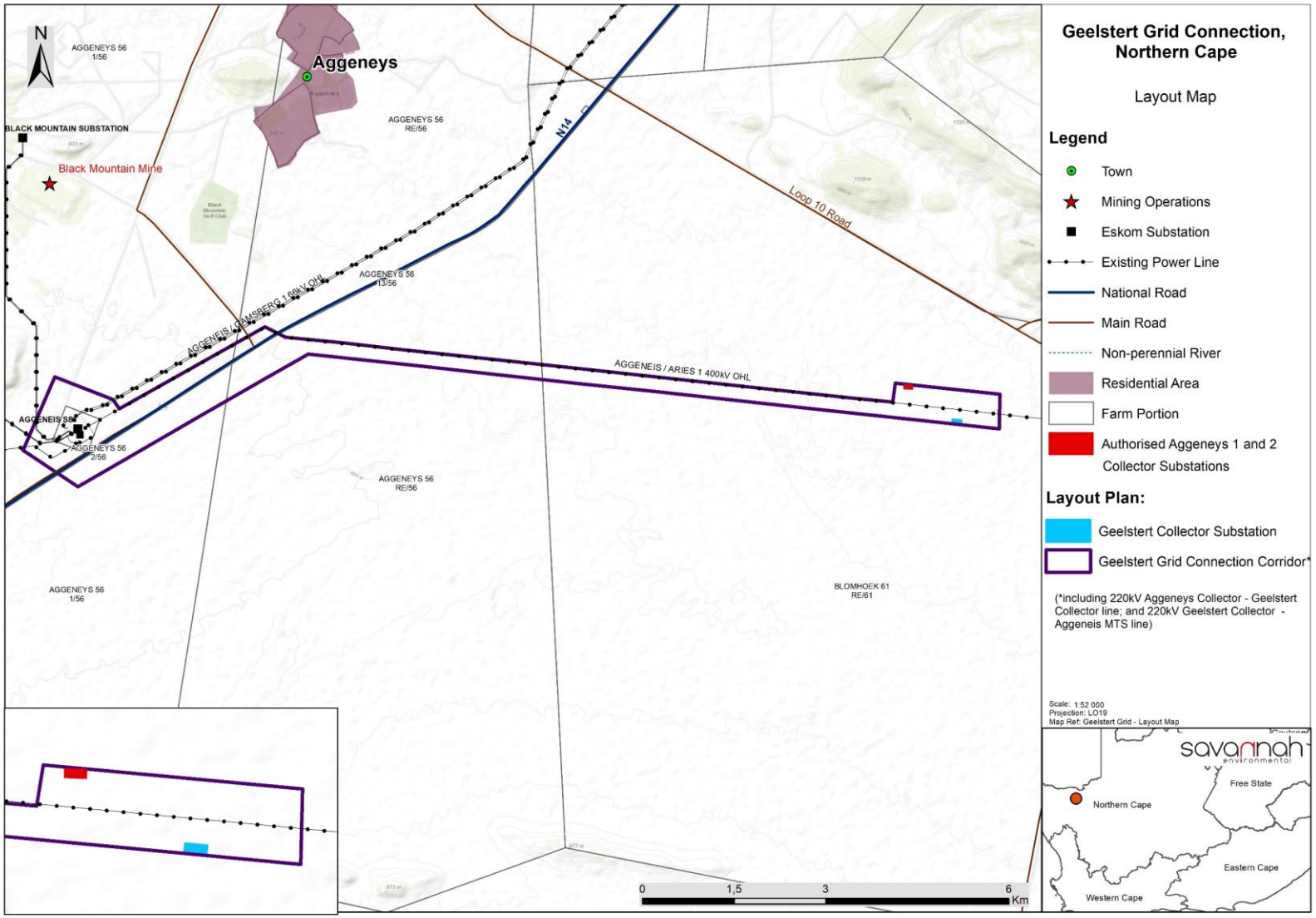

Figure 8.1: Map illustrating the grid connection corridor assessed for the development of the Geelstert Grid Connection (refer to Appendix M for A3 Map)

8.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the final BA Report includes the following information required in terms of Appendix 1: Content of the BA Report:

Requirement	Relevant Section
3(h)(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed, (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated.	The impacts and risk associated with the development of the Geelstert Grid Connection including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which the impact can be reversed and cause an irreplaceable loss of resources are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3, 8.8.3, and 8.9.3.
3(h)(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The positive and negative impacts associated with the development of the Geelstert Grid Connection are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3, 8.8.3, and 8.9.3.
3(h)(viii) the possible mitigation measures that could be applied and the level of residual risk.	The mitigation measures recommended for the reduction or enhancement of impact significance associated with the Geelstert Grid Connection are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3, 8.8.3, and 8.9.3.
3(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures,.	A description of all environmental impacts identified for the Geelstert Grid Connection during the BA process, and the extent to which the impact significance can be reduced through the implementation of the recommended mitigation measures provided by the specialists are included in sections 8.3.2, 8.4.2, 8.5.2, 8.6.2, 8.7.2. 8.8.2, and 8.9.2.
3(j) an assessment of each identified potentially significant impact and risk, including (i) cumulative impacts, (ii) the nature, significance and consequences of the impact and risk, (iii) the extent and duration of the impact and risk, (iv) the probability of the impact and risk occurring, (v) the degree to which the impact and risk can be reversed, (vi) the degree to which the impact and risk may cause irreplaceable loss of resources and, (vii) the degree to which the impact and risk can be avoided, managed or mitigated.	An assessment of each impact associated with the development of the Geelstert Grid Connection, including the nature and significance, the extent and duration, the probability, the reversibility, and the potential loss of irreplaceable resources, as well as the degree to which the significance of the impacts can be mitigated are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3, 8.8.3, and 8.9.3.
3(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr.	Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3, 8.8.3, and 8.9.3. Project specific measures have also been included in the EMPr(s) for the project (**Appendix L**).

8.2. Quantification of Areas of Disturbance within the Grid Connection Corridor

Environmental issues associated with pre-construction, construction and decommissioning activities may include, among others, the direct loss of vegetation and species of special concern; disturbance of fauna and avifauna and a loss of habitat; impacts on ephemeral watercourses and depression wetlands through direct impacts or the possible increase in surface water run-off; impacts on soils; heritage impacts and nuisance impacts from the movement of vehicles transporting equipment and materials to the grid connection corridor. Impacts identified for the operation phase of the project include collisions and electrocutions of avifauna by the power line infrastructure; visual impacts including night-time lighting; and potential impacts of alien plant species invasion. The following is relevant:

» The Geelstert Collector Substation will have an extent of 1.25ha; and
» The power line of up to 220kV will be constructed within a 47m wide servitude, over a distance of up to 17.5km. The footprint of each of the pylons/towers is typically between 1m^2 and 4m^2 in extent, with a typical span of between 200m and 375m, depending on the topography, terrain and the sensitive environmental features within the grid connection corridor.

8.3. Assessments of Impacts on Ecology (Ecology, Flora and Fauna)

Potential ecological impacts resulting from the development of the grid connection infrastructure will stem from a variety of different activities and risk factors associated with the pre-construction, construction, operation and decommissioning phases and would include impacts on vegetation and protected plant species, direct faunal impacts, and habitat degradation as a result of erosion and alien plant invasion. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix D** for more details).

8.3.1 Results of the Ecological Impact Assessment

The grid connection corridor for the Geelstert Grid Connection is located mostly within low sensitivity areas, and the Koa River Palaeovalley dune habitat which is associated with a medium sensitivity. There are freshwater features present within the grid connection corridor which are associated with a high sensitivity. The features are of a limited extent and will be spanned by the grid connection infrastructure (refer to **Figure 8.2**). One ephemeral watercourse within the grid connection corridor and adjacent to the Geelstert 1 development footprint is associated with a very high sensitivity, mainly due to the presence of the protected *Boscia foetida subsp. foetida* tree species. As a result of the narrow width of the watercourse, it will be easily spanned by the grid connection infrastructure, therefore the impact on this feature can be avoided.

From the outcomes of the Ecological Impact Assessment (**Appendix D** of the final BA Report), there are no fatal flaws or high-post mitigation impacts that should prevent the development of the Geelstert Grid Connection from proceeding.

Figure 8.2 below illustrates the ecological sensitivity associated with the grid connection corridor for the Geelstert Grid Connection and shows the location of the Geelstert Collector Substation within areas of a low sensitivity.

8.3.2 Description of Ecological Impacts

The following potential impacts have been identified and are considered to be relevant to the development of the Geelstert Grid Connection infrastructure within the assessed grid connection corridor.

Impacts on vegetation and protected plant species

Several protected species occur within the grid connection corridor and may be impacted by the development of the grid connection infrastructure. Vegetation clearing, an inevitable consequence of the proposed development during construction, will lead to the loss of currently intact habitat within the grid connection corridor (including the site for the development of the collector substation) and the final power line servitude. As this impact is certain to occur, it has been assessed for the construction phase, although the consequences will persist for a long time after the completion of the construction phase.

Direct faunal impacts

Increased levels of noise, pollution, disturbance, and human presence during the construction phase will have an impact on fauna. Sensitive and shy fauna will move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species (i.e. tortoises and snakes, etc.) would not be able to avoid the construction activities and might be killed. Some impact on fauna is highly likely to occur during the construction phase, as well as the operation phase, and this impact will therefore be assessed for the construction phase and operation phase.

Habitat degradation due to erosion and alien plant invasion

Disturbance created during the construction phase will leave the affected areas (as a result of vegetation clearance) vulnerable to erosion and alien plant invasion for several years into the operation phase of the development. Although the current abundance of alien plant species within the grid connection corridor is low, a variety of alien plant species including *Prosopsis glandulosa* are present in the wider area and it would be likely that these would therefore invade the disturbed areas.

Within the dune habitat, soil erosion is a high risk and follow-up monitoring after the completion of the construction phase would be required.

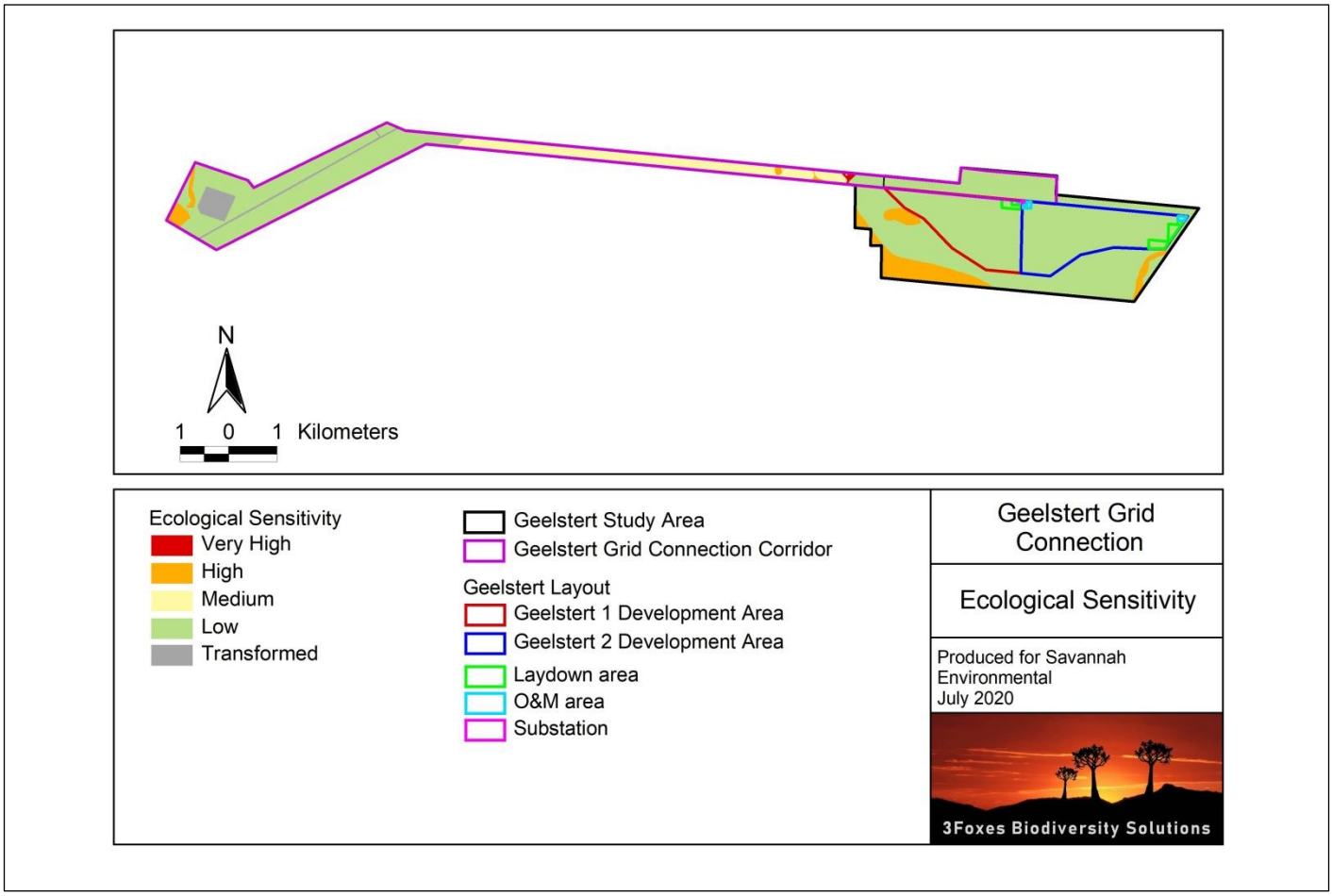

Figure 8.2: Ecological sensitivity map of the Geelstert Grid Connection.

8.3.3 Impact tables summarising the significance of impacts on ecology during construction, operation and decommission phase (with and without mitigation)

Construction Phase Impacts

Nature: *Impacts on vegetation and protected plant species* Impacts on vegetation will occur due to disturbance and vegetation clearing associated with the construction of the grid connection infrastructure. In addition, there will be some loss of individuals of protected plant species.		
	Without Mitigation	***With Mitigation***
Extent	Local (1)	Local (1)
Duration	Long-term (3)	Long-term (3)
Magnitude	Low (4)	Low (3)
Probability	Definite (5)	High Likely (4)
Significance	**Medium (40)**	**Low (28)**
Status	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources	Low	Low

Can impacts be mitigated?	This impact cannot be fully mitigated because the loss of vegetation and any individuals of protected species is unavoidable and is a certain outcome of the development of the grid connection infrastructure.
Mitigation	» A pre-construction walk-through of the collector substation development area and the power line servitude must be undertaken to locate species of conservation concern that can be translocated as well as comply with the Northern Cape Nature Conservation Act and DAEARD&LR permit conditions. » Search and rescue for identified species of concern must be undertaken before construction. » Vegetation clearing to commence only after the walk-through has been conducted and the necessary permits obtained. » Pre-construction environmental induction for all construction staff on site must be undertaken to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc. » Contractor's Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities within sensitive areas. » Vegetation clearing must be kept to a minimum. No unnecessary vegetation must be cleared. » All construction vehicles must adhere to clearly defined and demarcated roads. No off-road driving must be allowed outside of the construction area. » Temporary laydown areas must be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas must be rehabilitated after use.
Residual Risks	As the loss of currently intact vegetation is an unavoidable consequence of the grid connection infrastructure, the habitat loss associated with the development is of a low residual impact after mitigation and avoidance of more sensitive areas.

Nature: *Direct Faunal impacts due to construction activities*
Disturbance, transformation, and loss of habitat will have a negative effect on resident fauna during the construction phase. Due to noise and operation of heavy machinery, faunal disturbance will extend well beyond the grid connection infrastructure and extend into adjacent areas. This will however be transient and restricted to the construction phase.

	Without Mitigation	***With Mitigation***
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Medium (5)	Low (3)
Probability	Highly Probable (4)	Probable (3)
Significance	**Low (28)**	**Low (15)**
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No

Can impacts be mitigated?	Although noise and disturbance generated in the vicinity of the final grid connection servitude during construction is largely unavoidable, these are transient and impacts such as those resulting from the presence of construction personnel at the site can be readily mitigated.
Mitigation	» All personnel must undergo environmental induction with regards to fauna and awareness about not harming or collecting species such as snakes, tortoises and owls, which are often persecuted out of superstition. » Any fauna threatened by the construction activities must be removed to safety by an appropriately qualified environmental officer. » All construction vehicles on-site must adhere to a low speed limit (45km/h for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises. » All hazardous materials must be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site must be cleaned up in the appropriate manner as related to the nature of the spill. » If holes or trenches need to be dug for pylons, electrical cabling, or other purpose, these must not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches that are standing open must have places where there are soil ramps allowing fauna to escape the trench.
Residual Risks	It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.

Operation Phase Impacts

Nature: *Faunal impacts due to the operation phase*
The operation and presence of the grid connection infrastructure may lead to disturbance or persecution of fauna within or adjacent to the servitude.

	Without Mitigation	***With Mitigation***
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (27)**	**Low (14)**
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	To a large extent, but some low-level residual impact due to noise and human disturbance during maintenance is likely.	

Mitigation	» Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities must be removed to a safe location. » If the collector substation site must be lit at night for security purposes, this must be done with downward-directed low-UV type lights (such as most LEDs and HPS bulbs), which are less attractive to insects. » All hazardous materials must be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site must be cleaned up in the appropriate manner as related to the nature of the spill. » All vehicles accessing the site must adhere to a low speed limit (45km/h) to avoid collisions with susceptible species such as snakes and tortoises. » If the collector substation area or other components are to be fenced, then no electrified strands must be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences because they do not move away when electrocuted but rather adopt defensive behavior and are killed by repeated shocks.
Residual Risks	Disturbance from maintenance activities will occur at a low level with the result that disturbance would be largely restricted to the site.

Nature*: *Habitat degradation due to erosion and alien plant invasion
Disturbance created during the construction phase will leave the affected areas vulnerable to erosion and alien plant invasion for several years into the operation phase.

	Without Mitigation	***With Mitigation***
Extent	Local (1)	Local (1)
Duration	Medium-term (2)	Short-term (1)
Magnitude	Medium (4)	Low (2)
Probability	Likely (4)	Likely (3)
Significance	**Low (28)**	**Low (12)**
Status	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources	Moderate	Low
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation	» Undertake annual monitoring for erosion and alien plant invasion problems along the power line route/servitude. » All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. » Undertake follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs, grasses, and trees from the local area. » Alien management at the site must take place according to the Alien Invasive Management Plan. » Undertake regular (annual) monitoring for alien plants during the operation phase to ensure that no alien invasive problems have developed as result of the disturbance, as per the Alien Management Plan for the project. » Woody aliens must be controlled on at least an annual basis using the appropriate alien control techniques as determined by the species present.	

Residual Risks	Some erosion and alien plant invasion is likely to occur even with the implementation of control measures, but would have a low impact if effectively managed.

Decommissioning Phase Impacts

Nature: ***Habitat degradation due to erosion and alien plant invasion.*** Disturbance created during the decommissioning phase will leave the site vulnerable to erosion and alien plant invasion for several years.		
	Without Mitigation	***With Mitigation***
Extent	Local (1)	Local (1)
Duration	Medium-term (2)	Short-term (1)
Magnitude	Medium (4)	Low (2)
Probability	Likely (4)	Likely (3)
Significance	**Low (28)**	**Low (12)**
Status	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources	Moderate	Low
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation	» Erosion management must make provision for monitoring of the site for at least 5 years after decommissioning. » All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. » Undertake follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs, grasses and trees from the local area. » Alien management at the site must take place according to the Alien Invasive Management Plan. This must make provision for alien monitoring and management for at least 5 years after decommissioning. » Undertake regular (annual) monitoring for alien plant invasion during operation to ensure that no erosion problems have developed as result of the disturbance, as per the Alien Management Plan for the project. » Woody aliens must be controlled on at least an annual basis using the appropriate alien control techniques as determined by the species present.	
Residual Risks	Some erosion and alien plant invasion is likely to occur even with the implementation of control measures, but would have a low impact if effectively managed.	

Nature: *Direct faunal impacts due to decommissioning activities.* Due to disturbance, noise and the operation of heavy machinery, faunal disturbance due to decommissioning will extend beyond the grid connection infrastructure and impact adjacent areas to some degree. This will however be transient and restricted to the period while machinery is operational. In the long term, decommissioning should restore the ecological functioning and at least some habitat value to the affected areas.		
	Without Mitigation	***With Mitigation***
Extent	Local (1)	Local (1)

Duration	Short-term (1)	Short-term (1)
Magnitude	Low (4)	Low (3)
Probability	Probable (4)	Probable (3)
Significance	**Low (24)**	**Low (15)**
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Although the noise and disturbance generated at the grid connection infrastructure during decommissioning is probably largely unavoidable, this will be transient and ultimately the habitat should be restored to something useable by the local fauna.	
Mitigation	» All personnel must undergo environmental induction with regards to fauna and, in particular, awareness about not harming or collecting species such as snakes, tortoises and owls, which are often persecuted out of superstition. » Any fauna threatened by the decommissioning activities must be removed to safety by an appropriately qualified environmental officer. » All vehicles must adhere to a low speed limit (45km/h) to avoid collisions with susceptible species such as snakes and tortoises. » All hazardous materials must be stored in the appropriate manner to prevent contamination of the site and ultimately removed from the site as part of decommissioning. Any accidental chemical, fuel and oil spills that occur at the site must be cleaned up in the appropriate manner as related to the nature of the spill. » The site must be rehabilitated with locally occurring species to restore ecosystem structure and function.	
Residual Risks	Although some components of disturbance cannot be avoided, no significant residual impacts are likely.	

8.3.4 Implications for Project Implementation

With the implementation of the mitigation measures by the proponent, contractors, and operational staff, the significance of ecological impacts associated with the Geelstert Grid Connection will be low following the implementation of the recommended mitigation measures. The assessed grid connection corridor is associated mainly with areas of low, medium, high, and very high sensitivity. The area of very high sensitivity is linked to the ephemeral and narrow watercourse located within the grid connection corridor and associated with the presence of the protected *Boscia foetida subsp. foetida* tree species. In addition the high and very high sensitivities can be spanned by the grid connection infrastructure. From the outcomes of the Ecological Impact Assessment (refer to **Appendix D** of the final BA Report), it is concluded that the development of the Geelstert Grid Connection is acceptable from an ecological perspective and the anticipated impacts can be managed by taking the following into consideration:

» A pre-consturction walk-through of the power line servitude and the site for the construction of the Geelstert Collector Substation should be undertaken in order to locate species of conservation concern that can be translocated, as well as comply with the Northern Cape Nature Conservation Act (Act No. 9 of 2009) of 2009; the National Environmental Management: Biodiversity Act (Act No. of 2004) of 2004 and the National Forest Act (Act No. 84 of 1998).

- Permits for the removal and translocation of species of conservation concern must be applied for from the relevant authorities, i.e. the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD&LR) and the Department of Enviornmental Affairs prior to the commencement of the construction phase.
- A search and rescue operation must be undertaken for all identified species of conservation concern prior to the commencement of the construction phase.
- Vegetation clearing within the power line servitude and at site earmarked for the devleopment of the collector substation must be kept to a minimum. No unnecessary vegetation must be cleared.
- Any fauna threatened by the construction activities should be removed to safety by the Environmental Officer (EO) or any other suitably qualified person.
- If the collector substation must be lit at night for security purposes, this must be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects.
- If the collector substation is to be fenced, then no electrified strands must be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences because they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.
- Annual Monitoring for erosion and alien invasive plant species must be undertaken within the power line servitude. Alien Management (including monitoring) should be undertaken in accordacne with an Alien Management Plan. Woody alien invasive plant species must be monitored and managed on an annual basis using the appropriate control techniques as determined by the woody plant species present in the area.

8.4. Assessment of Impacts on Avifauna

The significance of the impacts on avifauna expected with the development of the Geelstert Grid Connection has been assessed as low and medium (depending on the impact being assessed), following the implementation of the mitigation measures. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details). The Avifauna Impact Assessment assessed the entire length of the grid connection corridor, as well as the grid connection infrastructure (i.e. Geelstert Collector Substation, power line pylons/towers, access road and jeep tracks, etc.)

8.4.1 Results of the Avifauna Impact Assessment

Important avian microhabitats play an integral role within the landscape, providing nesting, foraging and reproductive benefits to the local avifauna. In order to ensure that the development of the Geelstert Grid Connection does not have a long-term negative impact on the local avifauna, it is important to delineate these avian microhabitats within the surrounding area. An avian sensitivity map (refer to **Figure 8.3**) was generated by integrating avian microhabitats present within the grid connection corridor and the avifaunal information collected during the three field surveys undertaken within the grid connection corridor by the specialist.

The Geelstert Grid Connection corridor is mainly restricted between two microhabitats; the plains and the dune habitat. The plains habitat occupies the majority of the grid connection corridor, including the location of the Geelstert Collector Substation and does not appear to support any Red Lark avifauna species, as determined during the field surveys by the specialist. As a result, the plains habitat is associated with a low sensitivity (refer to **Figure 8.3**). Portions of the grid connection corridor, particularly around the Aggeneis MTS, are associated with a high and medium sensitivity due to the presence of the protected *Boscia foetida* trees and previously used raptor nests found within the trees and/or minor drainage lines.

The dune habitat restricted to the central section of the grid connection corridor supports the Red Lark avifauna species and is therefore of high sensitivity. One depression wetland is located within the grid connection corridor (**Figure 8.3**) and is associated with a very high sensitivity. This feature is considered to be a no-go for development; as a result, the grid connection infrastructure should span this feature. In addition, another depression wetland is located to the south of the grid connection corridor and it is associated with a very high sensitivity (and no-go for development); however, it is located outside the grid connection corridor.

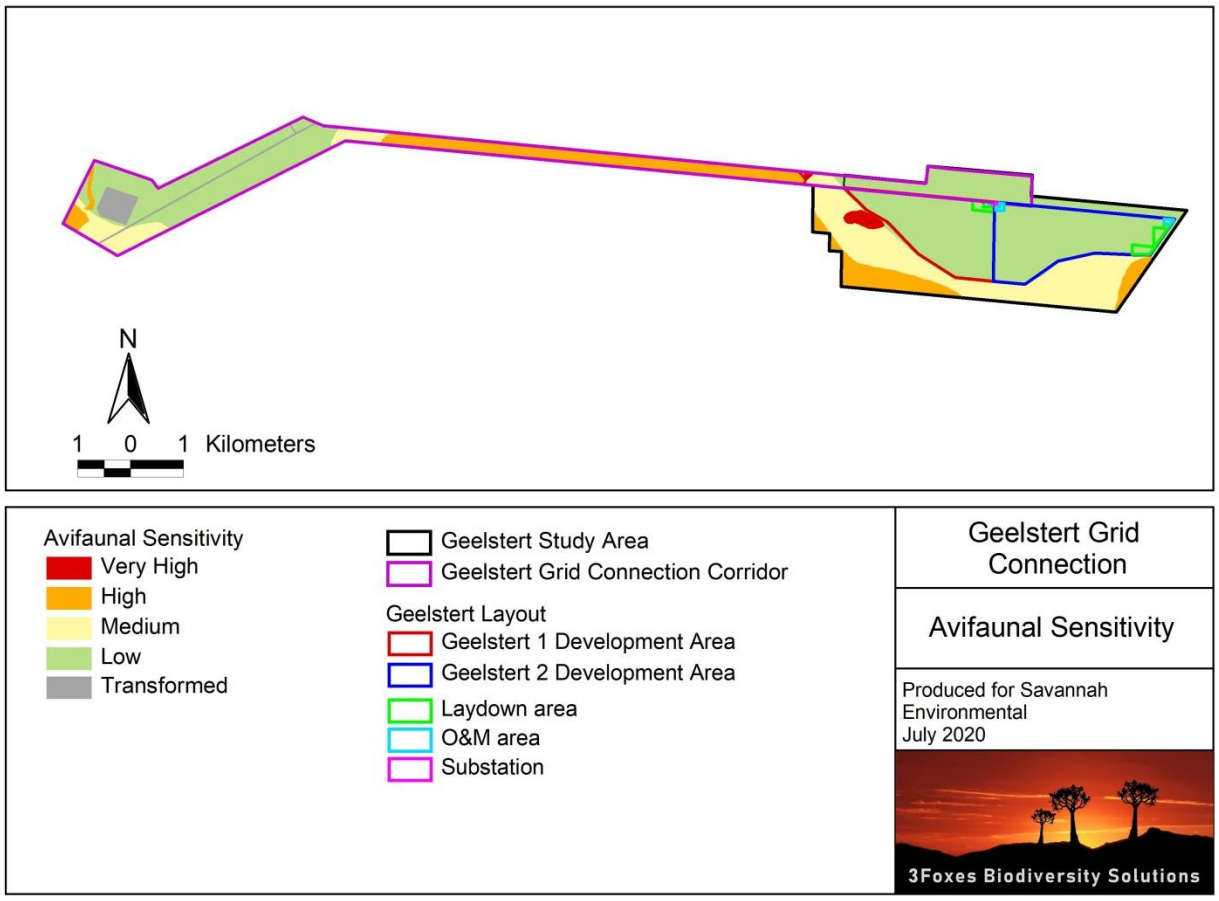

Figure 8.3: Avifauna Sensitivity Map for the Geelstert Grid Connection.

Although the grid connection corridor traverses the northern section of the dune habitat, the grid connection corridor follows the shortest route to the Aggeneis MTS and is largely located within areas of a low, medium and high sensitivity. The proposed routing runs parallel to the existing Aries/Aggeneis 400kV power line (consolidation of linear impacts). The overall impact of the Geelstert Grid Connection is anticipated to be low subject to the implementation of the mitigation measures.

8.4.2 Description of Avifaunal Impacts

The nature of the avifauna impacts associated with the Geelstert Grid Connection will be negative given that a section of the grid connection corridor is located within the dune habitat, which supports the Red Lark, and that there are Near-Threatened and Threatened avifauna species within the surrounding area.

These species may be susceptible to collisions and electrocutions with the grid connection infrastructure. However, the extent of these negative impacts is anticipated to be local, as the power line will be equivalent to 17.5km in length and will be located parallel to the existing Aries/Aggeneis 400kV Power Line, which has already resulted in an impact on avifauna in the area. The duration of the construction phase impacts (vegetation clearance and habitat disturbance) are anticipated to be short-term; whereas the impacts for the operation phase are anticipated to be long-term, however the significance of the impacts can be reduced to low following the implementation of the recommended mitigation measures. The anticipated avifauna impacts as a result of the development of described as follows:

Habitat loss and disturbance of small passerines

For the smaller passerine species, the most important impacts will involve temporary displacement from the area encompassed by the grid connection infrastructure as a result of habitat destruction and disturbance. While numerous species will be impacted, all of these species have large distribution ranges and due to the temporary nature of the impact, will therefore experience insignificant population declines in the area, and not on a regional or national level. Some of the most abundant species that will be impacted, and which are also common in neighbouring habitats, include Red Lark, Spike-heeled Lark, Rufous-eared Warbler, Chat Flycatcher, Tractrac Chat, and Karoo Chat. The loss of habitat and disturbance will be largely restricted to the construction phase and long-term impacts during the operation phase of the Geelstert Grid Connection would be restricted largely to a small amount of habitat loss. The impacts in general can be expected to be minimal as the smaller species are far less susceptible to the associated impacts of power lines than larger-bodied species.

Habitat loss and disturbance of medium terrestrial birds and raptors

Small to medium sized non-passerines that may be impacted to some extent due to habitat loss and displacement include resident raptors such as the Greater Kestrel *Falco rupicoloides*, and the ground-dwelling Namaqua Sandgrouse, and Double-banded Courser *Rhinoptilus africanus*. While these species may be susceptible to collisions with power lines and substations, the development is not expected to have a major impact on most of these species.

Habitat loss, disturbance and collision risk of large terrestrial birds and raptors

The group of primary concern is the medium to large non-passerines, which include the large terrestrial birds and diurnal raptors. Many of these are also red-listed, such as the Martial Eagle, Ludwig's Bustard, Verreaux's Eagle, Secretarybird and Karoo Korhaan. Besides the minor loss of foraging habitat that these species will experience, disturbances during the construction phase of the grid connection infrastructure is also expected to have a negative impact. Most of these species are also highly susceptible to collisions with power lines owing to reduced ability to see the power lines and reduced manoeuvrability in flight to avoid collisions. All large terrestrial birds, including the red-listed species, are killed in substantial numbers by existing and newly erected power lines in the country. An additional threat faced by the large raptors is electrocution when perched or attempting to perch on power line structures.

8.4.3 Impact tables summarising the significance of impacts on avifauna during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: *Direct avifauna impacts during construction* Direct avifaunal impacts during the construction phase are expected to occur. These include habitat loss and disturbance due to vegetation clearing and the operation of heavy machinery within the grid connection corridor

and the increased human presence.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (5)	Moderate (5)
Probability	Highly Likely (4)	Probable (3)
Significance	**Medium (32)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	High	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Although, there will be some habitat loss that cannot be well mitigated, impacts on avifauna will be transient and of low magnitude during the construction phase.	

Mitigation:

- A pre-construction walk-through of the grid connection corridor must be undertaken to identify areas of avifaunal sensitivity, such as raptor nests in the proximity of the grid connection infrastructure.
- Prior to construction, the design and layout of proposed power line and collector substation infrastructure must be endorsed by members of the Eskom-EWT Strategic Partnership, taking into account the mitigation guidelines recommended by Birdlife South Africa.
- Only power line pylons/towers that are considered safe for birds must be erected to avoid the electrocutions of birds (particularly large raptors) perching or attempting to perch. Where necessary, deterrent devices such as bird guards must be mounted on relevant parts of the pylons to further reduce the possibility of electrocutions.
- The route that the grid connection corridor will follow must be the shortest distance possible across an area where collisions are expected, or follow existing power lines, and be marked with bird diverters to make the power lines as visible as possible to collision-susceptible species. Recommended bird diverters such as brightly coloured 'aviation balls, thickened wire spirals, or flapping devices that increase the visibility of the power line must be fitted where considered necessary.
- The potential to stagger the position of the power line pylons in relation to the existing telephone or power line pylons must be investigated, as this may assist in increasing the visibility of the power line to large flying birds such as bustards, which may regularly fly through the area.
- All personnel must undergo environmental induction with regard to avifauna and in particular awareness about not harming, collecting, or hunting ground-dwelling species (e.g. bustards, korhaans, thick-knees and coursers), and owls, which are often persecuted out of superstition.
- Induction must also include awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc.
- All construction vehicles must adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.
- The use of laydown areas within the footprint of the grid connection corridor must be used where feasible, to avoid habitat loss and disturbance to adjoining areas.
- All building waste produced during the construction phase must be removed from the grid connection corridor and be disposed of at a designated waste management facility. Similarly, all liquid wastes must be contained in appropriately sealed vessels/ponds within the footprint of the grid connection infrastructure and be disposed of at a designated waste management facility after use. Any liquid and chemical spills must be dealt with accordingly to avoid the contamination of the environment.
- Any avifauna threatened by the construction activities should be removed to safety by the Environmental Officer (EO) or appropriately qualified person.
- If lights are to be used at night for ensuring that infrastructure on site is lit, this must be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects. The use of lighting at night must be kept to a minimum, so as not to unnecessarily attract invertebrates to the collector substation and possibly their avian predators, and to minimise disturbance to birds flying over the substation at night.
- All vehicles (construction or other) accessing the site must adhere to a low speed limit (45km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars, thick-knees and owls)

which sometimes forage or rest on roads, especially at night.

» No construction activity must occur near active raptor nests should these be discovered prior to or during the construction phase. If active nests are discovered near construction areas, these should be reported to the Environmental Control Officer (ECO) and must be monitored until the birds have finished nesting and the fledglings have left the nest.

» If holes or trenches need to be dug for cables or pylons, these must not be left open for extended periods of time as ground-dwelling avifauna or their flightless young may become entrapped therein. Holes must only be dug when they are required and must be used and filled shortly thereafter.

Residual Impacts:

The loss of habitat associated with the grid connection corridor is an unavoidable consequence of the construction of the grid connection infrastructure and remains a residual impact even after mitigation and avoidance of more sensitive areas. Although the sensitivity of the affected habitat is high for the dune habitat, the overall residual impact on avifaunal habitat loss remains low due to the small footprint of the pylons and the collector substation (<2ha), while the power line will not pose a threat to the Red Lark species. Although the use of power line pylons that are considered safe for large birds will contribute to reducing the potential impacts of the power line, future collisions with power line will remain a risk. This can be reduced further by 'staggering' the pylons in relation to existing pylons of the Aries/Aggeneis 400kV power line during the construction phase, so that the profile of the power line will be more visible to flying birds.

Operation Phase Impacts

Nature: *Direct avifauna impacts during the operation phase – collisions and electrocutions with the grid connection infrastructure*

While some species may be susceptible to collisions with power lines, this is not expected to have a major impact on most of the species. Their smaller size and hence better manoeuvrability, as well as sedentary lifestyle and knowledge of their environs, ensures that they have a much lower probability of colliding with power lines.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (5)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**Medium (40)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	High/Medium	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	To a large extent, although the bird flappers and other bird diverters are not 100% effective and so there would still be some residual impact.	

Mitigation:

» Regular monitoring of power line must be undertaken to detect bird carcasses, and to enable the identification of any areas of high impact to be marked with bird diverters.

» Any movements by vehicle and personnel must be limited to the power line servitude, especially during routine maintenance procedures.

» Any raptor nests that are discovered on the power line structures must be reported to the Environmental Officer, while utmost care must be taken to not disturb these nests during routine maintenance procedures.

Residual Impacts:

Deterrent devices such as bird guards to reduce electrocutions, and flight diverters to reduce the risk of collisions with power lines and substations are not 100% effective and some residual impact is likely to occur.

Decommissioning Phase Impacts

Nature: *Avifaunal impacts due to decommissioning activities*
Avifaunal impacts are expected to occur due to decommissioning activities. These include disturbance, noise, and the operation of heavy machinery. Avifaunal disturbance due to decommissioning will extend beyond the power line servitude and impact adjacent areas to some degree. This will however be transient and restricted to the period while machinery is operational. In the long term, decommissioning should restore the ecological functioning and at least some habitat value to the power line servitude.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (4)	Low to Moderate (3)
Probability	Definite (5)	Definite (5)
Significance	**Medium (35)**	**Medium (30)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	No
Can impacts be mitigated?	Disturbance can be mitigated to an extent as it will be transient and have no long-term impact.	

Mitigation:

- All infrastructure must be removed from the servitude and disposed of in the appropriate manner.
- All waste produced during decommissioning must be disposed of at a designated waste management facility.
- Environmental induction for all personnel on site must be undertaken to ensure that basic environmental principles are adhered to, and awareness about not harming or hunting ground-dwelling species (e.g. bustards, korhaans, thick-knees and coursers), and owls, which are often persecuted out of superstition.
- All construction vehicles must adhere to clearly defined and demarcated roads. No off-road driving must be allowed in undisturbed natural areas outside of the decommissioning area.
- All construction vehicles must adhere to a low speed limit (45km/h on site) to avoid collisions with susceptible species such nocturnal and crepuscular species (e.g. nightjars, thick-knees, and owls) which sometimes forage or rest along roads.
- Any avifauna threatened by the activities should be removed to safety by the Environmental Officer (EO) or appropriately qualified person.
- If holes or trenches need to be dug, these must not be left open for extended periods of time as ground-dwelling avifauna or their flightless young may become entrapped in them. Holes must only be dug when they are required and must be used and filled shortly thereafter.
- No activity must occur near active raptor nests should these be discovered prior to or during the decommissioning phase. If active nests are discovered near the decommissioning areas, these must be reported to the ECO and must be monitored until the birds have finished nesting and the fledglings left the nest.
- All disturbed and cleared areas must be revegetated with indigenous perennial shrubs and grasses from the local area.

Residual Impacts:
Disturbance during the decommissioning phase is an unavoidable consequence but will have a low residual impact with the implementation of the recommended mitigation measures. Although, the sensitivity of the affected habitat ranges from low to high, the overall residual impact on avifaunal habitat loss remains low as the habitat can be readily rehabilitated due to small footprint of the grid connection infrastructure.

8.4.4 Implications for Project Implementation

With the implementation of the mitigation measures by the proponent, contractors, and operational staff, the significance of avifauna impacts associated with the Geelstert Grid Connection will be low and

medium (depending on the impact being assessed). The assessed grid connection corridor is associated with areas of low, medium, high and very high sensitivity. The area of very high sensitivity is linked to the depression wetland located within the grid connection corridor.

From the Avifauna Impact Assessment (**Appendix E** of the final BA Report), it is concluded that the development of the Geelstert Grid Connection is acceptable from an avifauna perspective, and the anticipated impacts can be managed by taking the following mitigation measures into consideration:

- The depression wetland located within the grid connection corridor and associated with a very high sensitivity should be excluded from development. The development of infrastructure within this feature, or the associated buffer area of 15m, is not permitted.
- A pre-construction walk-through survey of the grid connection corridor and/or power line servitude must be undertaken prior to the commencement of the pre-construction and construction phase of the project to identify areas within the servitude that are associated with active raptor nests.
- During the Planning and Design Phase of the project, the design and layout of the power line and the collector substation must be endorsed by members of the Eskom-EWT Strategic Partnership and taking into consideration any mitigation guidelines recommended by BirdLife South Africa.
- Only pylons/towers that are considered safe for birds must be erected for the project in order to avoid the electrocution of birds, particularly large raptors.
- Deterrent devices, such as bird guards must be used and be mounted on relevant parts of the pylons/towers to further reduce the possibility of electrocutions.
- The route that the power line servitude is to follow within the grid connection corridor must be the shortest distance possible across an area where collisions are expected, or follow existing power lines and be marked with bird diverters to make the power line as visible as possible to collision-susceptible species. Recommended bird diverters such as brightly coloured 'aviation balls', thickened wire spirals, or flapping devices that increase the visibility of the power line must be fitted where necessary.
- The potential to stagger the position of the power line pylons/towers in relation to the existing telephone or power line pylons must be investigated, as this may assist in increasing the visibility of the power line to large flying birds such as bustards, which may regularly fly through the area.

8.5. Potential Impacts on Freshwater Features

The impacts on freshwater features expected with the Geelstert Grid Connection corridor have been assessed as low, with the implementation of the recommended mitigation measures. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix F** of the final BA Report for more details). The majority of the impacts on freshwater features within the grid connection corridor would occur during the construction phase as result of the disturbance related to the construction activities.

8.5.1 Results of the Freshwater Impact Assessment

A total of 9 depression wetlands; 9 ephemeral watercourses; and 14 smaller ephemeral drainage lines/channels were identified within the regulated area of Geelstert Grid Connection corridor. The field survey undertaken by the specialist confirmed that only 3 depression wetlands; and 7 ephemeral watercourses were at a high risk of being impacted by the development (refer to **Figure 8.4** and **Figure 8.5**). In addition, the survey determined that 3 depression wetlands and one small ephemeral drainage line/channel had a medium risk of being impacted by the development of the Geelstert Grid Connection.

The other freshwater features would not be impacted by the development of the grid connection infrastructure as they are located outside of the grid connection corridor.

From a freshwater perspective, the depression wetlands are considered to be ecologically important and sensitive as they are known to be important Red Lark habitat. It is possible that the Red Lark frequents these features during periods of saturation. In addition, the depression wetlands are known to be a habitat for invertebrates such as branchiopods, crustaceans, and dipterans. Therefore, these features serve as important feeding sites for local and migrating avifauna species in the area. As a result, the depression wetlands within the grid connection corridor are associated with a high sensitivity and **15m buffer** must be implemented around these features during the construction, operation and decommissioning phases of the Geelstert Grid Connection (**Figure 8.4**).

The larger ephemeral watercourses located within the grid connection corridor are ecologically important and sensitive as they provide the preferred habitat for Red Lark. These species are likely to frequent these features following rainfall events in the area. These ephemeral watercourses also serve as sources of food for various migratory fauna and avifauna species in the area. The watercourses are also important migration routes and corridors for the Red Lark. As a result, a **32m buffer** must be implemented around the larger ephemeral watercourses during the construction, operation and decommissioning phases of the Geelstert Grid Connection.

The smaller ephemeral drainage lines/channels are predominantly located within the larger ephemeral watercourse that runs beneath the N14 in north-west and south-west direction (**Figure 8.5**). These channels are described as being discontinuous, poorly developed, and consequently never have any baseflow. However, a **32m buffer** must be implemented within these features during the construction, operation and decommissioning phases of the Geelstert Grid Connection.

No watercourses were identified within the area earmarked for the construction of the Geelstert Collector Substation, as a result, the collector substation will not have an impact on the integrity and functioning of the ecological services provided by these delineated freshwater features within the grid connection corridor and the surrounding area.

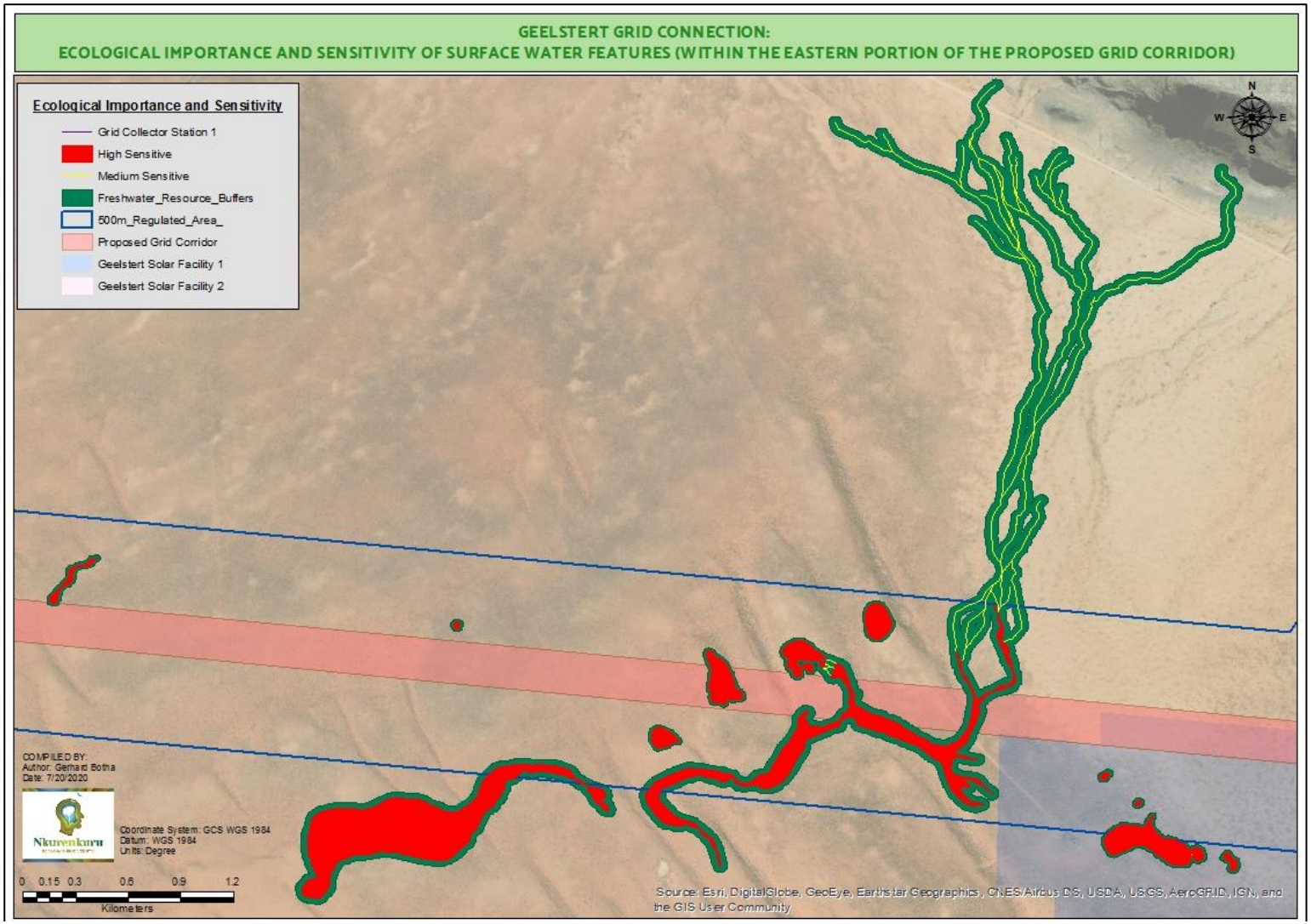

Figure 8.4: Freshwater delineation map showing sensitivities of the freshwater features identified within the eastern section of the grid connection corridor (outside of the Geelstert Collector Substation footprint).

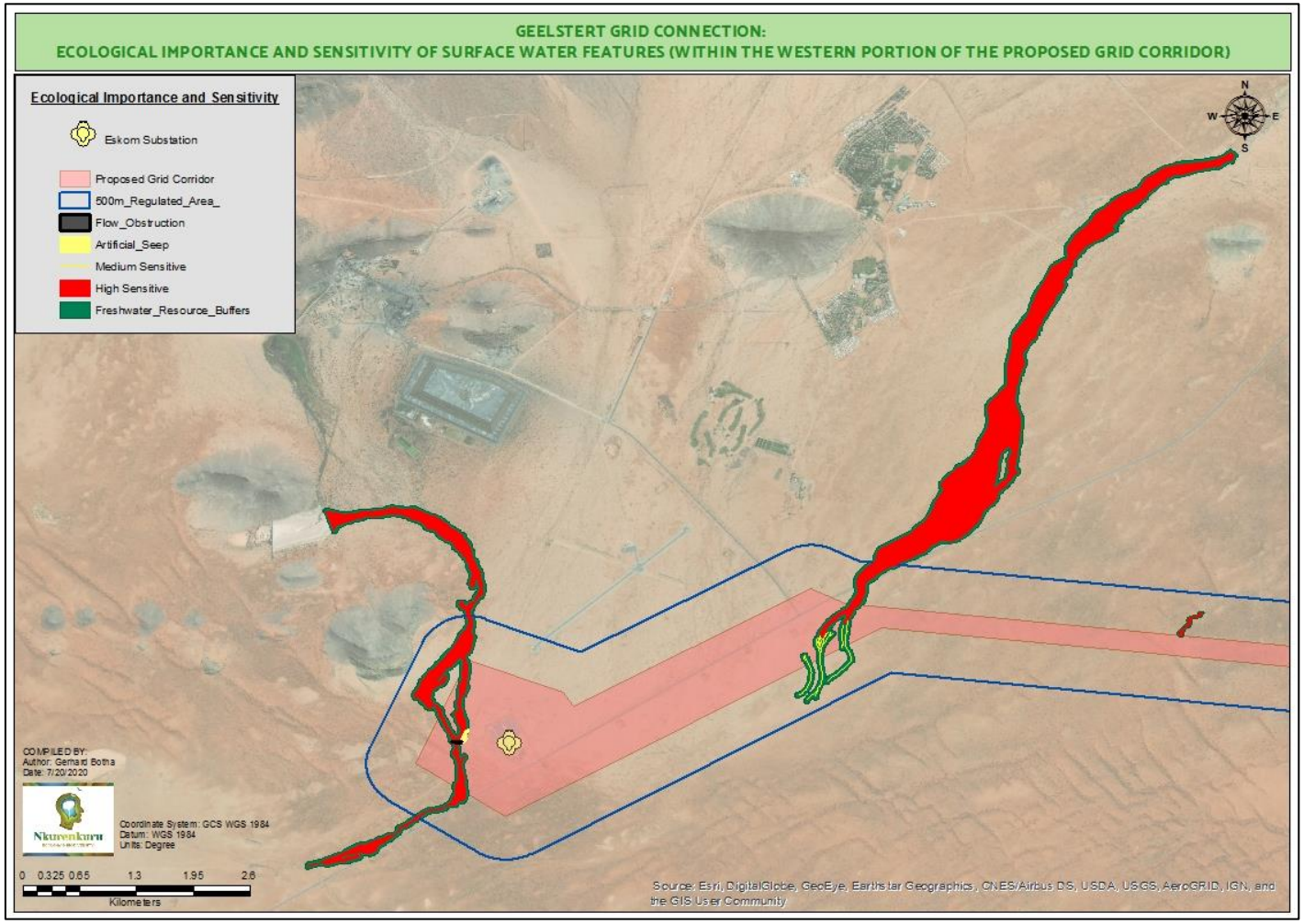

Figure 8.5: Freshwater delineation map showing sensitivities of the freshwater features identified within the western section of the grid connection corridor (up to the Aggeneis MTS).

8.5.2 Description of Freshwater Impacts

Potential impacts on the freshwater features would occur mainly during the construction phase of the Geelstert Grid Connection, as a result of the disturbance associated with the operation of machinery and equipment in the area and the presence of personnel during the construction phase. The following impacts are anticipated for the construction (including decommissioning phase), and operation phase of the Geelstert Grid Connection from a freshwater perspective:

Loss/disturbance of surface water resource habitat and fauna

The primary threat related to the development of the Geelstert Grid Connection relates to the clearance of vegetation within the power line servitude and the development footprint of the Geelstert Collector Substation. This will lead to a loss of habitat for fauna and avifauna located within the vicinity of the grid connection corridor and the surrounding area.

Impact on localised surface water quality

The use of chemicals and hydrocarbons (i.e. oils, hydraulic oils, cleaning fluids, cement etc.) during the construction phase, due to the presence of vehicles and equipment, could have an impact on freshwater features located within and downstream of the grid connection corridor. This could affect the localised surface water quality of the area.

Altered hydrology due to interception, impoundment, and diversion of flows

The impact refers to the alteration of the physical characteristics of the freshwater features as a result of increased turbidity and sediment deposition which will be caused by soil erosion and the undertaking of earthworks that are associated with construction activities of the Geelstert Grid Connection.

Increase in sedimentation and erosion

An alteration to the physical characteristics of the freshwater features, caused by soil erosion, as well as the instability and collapse of unstable soils during the operation phase of the Geelstert Grid Connection.

8.5.3 Impact tables summarising the significance of impacts on freshwater features during construction (including decommissioning) and operation (with and without mitigation)

Construction Phase Impacts

Nature: *Loss and disturbance of habitats and fauna*

This impact refers to the direct physical destruction or disturbance of aquatic habitat caused by vegetation clearing, disturbance of wetland habitat, encroachment/colonisation of habitat by invasive alien plants and the alteration of wetland geomorphological profiles (including stream beds and banks). Possible ecological consequences associated with this impact may include:

- Reduction in representation and conservation of freshwater ecosystem/habitat types;
- Reduction in the supply of ecosystem goods and services;
- Reduction/loss of habitat for aquatic dependent flora and fauna; and
- Reduction in and/or loss of species of conservation concern (i.e. rare, threatened/endangered species).

The physical removal of the narrow strips of riparian zones and disturbance of any alluvial watercourses as a result of the construction of the grid connection infrastructure. This impact would be localised, as a large portion of the remaining catchment area would remain intact.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Low (4)	Small (0)
Probability	Probable (3)	Improbable (2)
Significance	**Low (27)**	**Low (8)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to a large extent.	

Mitigation:

» Use existing service roads where freshwater features are to be crossed.
» Where new crossings are required, the Engineering Team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) as well as minimise the loss of vegetation (small footprint).
» No vehicles are to be refuelled within watercourses/ riparian vegetation.
» No pylons/towers must be placed within the freshwater features as well as the recommended buffer areas.
» No laydown areas, stockpiling or any activity related to the construction phase may occur within the freshwater features as well as the recommended buffer areas.

Residual Impacts:

Possible impact on the remaining catchment due to changes in run-off characteristics within the vicinity of the grid connection corridor.

Nature: *Impact on localised surface water quality*

This impact refers to the alteration or deterioration in the physical, chemical and biological characteristics of freshwater resources (i.e. water quality) such as the depression wetlands and the ephemeral watercourses, as a result of water/soil pollution. In the context of this impact assessment, water quality refers to its fitness for maintaining the health of aquatic ecosystems. Possible ecological consequences associated with this impact may include:

* Deterioration of the freshwater ecosystem integrity; and
* Reduction in and/or loss of species of conservation concern (i.e. rare, threatened/endangered species).

During pre-construction, construction and to a limited degree the operation phase, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet concrete, shutter-oil, etc.) associated with site-clearing machinery and construction activities could be washed downslope via the ephemeral systems.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	Medium	Low
Can impacts be mitigated?	Yes, to a large extent.	

Mitigation:

» Implement appropriate measures to ensure strict use and management of all hazardous materials used on site.
» Implement appropriate measures to ensure strict management of potential sources of pollutants (e.g. litter hydrocarbons from vehicles and machinery, cement during construction etc.).

- » Implement appropriate measures to ensure containment of all contaminated water by means of careful run-off management within the servitude.
- » Implement appropriate measures to ensure strict control over the behaviour of construction workers.
- » Working protocols incorporating pollution control measures (including approved Method Statements by the Contractor) must be clearly set out in the Construction Environmental Management Programme (CEMPr) for the project and must be strictly enforced.
- » Appropriate ablution facilities must be provided for construction workers during construction of the power line and collector substation and on-site staff during the operation phase of the grid connection infrastructure.

Residual Impacts:
Residual impacts will be negligible after appropriate mitigation measures have been implemented.

Nature: *Increased sedimentation and erosion during the construction phase*

This refers to the alteration in the physical characteristics of the depression wetlands and the ephemeral watercourses as a result of increased turbidity and sediment deposition, caused by soil erosion and earthworks that are associated with construction activities. Possible ecological consequences associated with this impact may include:

- * Deterioration of the freshwater ecosystem integrity; and
- * Reduction/loss of habitat for aquatic dependent flora and fauna.

This may furthermore, influence water quality downstream.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Very Short (1)
Magnitude	Low (2)	Small (0)
Probability	Probable (3)	Improbable (2)
Significance	**Low (21)**	**Low (4)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to a large extent.	

Mitigation:

- » Use only the existing service roads (of the existing Aries/Aggeneys 400kV Power Line) when crossing any of the ephemeral watercourses and the depression wetlands.
- » Any erosion observed to be associated with the grid connection infrastructure must be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- » All bare areas, as a result of the development, must be revegetated with locally occurring species, to bind the soil and limit erosion potential.
- » Silt traps must be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- » Topsoil must be removed and stored separately and must be re-applied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.
- » Where practical, phased development and vegetation clearing must be applied so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time.
- » Construction of gabions and other stabilisation features to prevent erosion must be undertaken, if deemed necessary.
- » There must be reduced activity within the servitude after large rainfall events when the soils are wet. No driving off of hardened roads must occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.
- » No pylons must be placed within the depression wetlands and the ephemeral watercourses, as well as their

recommended buffer areas.
» No laydown areas, stockpiling or any activity related to the construction phase may occur within these features as well as their buffer areas.

Residual Impacts:
Residual impacts will be negligible after appropriate mitigation measures have been implemented.

Operation Phase Impacts

Nature: *Increase in sedimentation and erosion within the grid connection infrastructure footprint, extending throughout the operation phase of the Geelstert Grid Connection.*
This refers to the alteration in the physical characteristics of the depression wetlands and the ephemeral watercourses, as a result of increased turbidity and sediment deposition, caused by soil erosion, as well as instability and collapse of unstable soils during the operation phase. Possible ecological consequences associated with this impact may include:

* Deterioration of the freshwater ecosystem integrity; and
* Reduction/loss of habitat for aquatic dependent flora and fauna.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (21)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to a large extent.	

Mitigation:
» Use only the existing service roads (of the existing Aries/Aggeneys 400kV Power Line) when crossing any of the ephemeral watercourses and the depression wetlands.
» Any erosion observed to be associated within the power line servitude must be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
» All bare areas, as a result of the development, must be revegetated with locally occurring species to bind the soil and limit erosion potential.
» Silt traps must be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
» Construction of gabions and other stabilisation features to prevent erosion must be undertaken, if deemed necessary.
» There must be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads must occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.

Residual Impacts:
Altered streambed morphology, however due to the extent and nature of the development, this residual impact is unlikely to occur.

Decommissioning Phase Impacts

During the decommissioning phase, the same potential impacts as identified for the construction phase, are expected. The same impacts, significance ratings and mitigation measures are applicable. Therefore, decommissioning impacts in terms of freshwater are not further considered.

8.5.4 Implications for Project Implementation

With the implementation of mitigation measures by the proponent, contractors, and operational staff, the significance of freshwater impacts associated with the Geelstert Grid Connection will be low. No impacts of a high or medium significance were identified. Therefore, from the Surface Water Resource Study and Assessment (**Appendix F** of the final BA Report), it is concluded that the development of the Geelstert Grid Connection is acceptable subject to the recommendations made by the specialist. On-site mitigation is viewed as the most practical and appropriate action, and viable options for reducing the overall impact of the development on these areas include the following:

- No pylon towers are to be placed directly within the wetlands and watercourses or the associated buffer zones, and are rather to be spanned across watercourses and the associated buffer zones.
- Existing service roads and tracks are to be used where reasonable and feasible;
- Where new road crossings are required, the engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion, as well as minimise the loss of vegetation; and
- A Water Use Authorisation should be obtained from the Department of Human Settlements, Water and Sanitation prior to the commencement of the construction phase of the Geelstert Grid Connection.

8.6. Assessment of Impacts on Soil and Agricultural Potential

The impact of the Geelstert Grid Connection on the soils and agricultural potential, has been assessed as low following the implementation of the recommended mitigation measures. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix G** of further details).

8.6.1 Results of the Soil Impact Assessment

The entire extent of the grid connection corridor is located within the land types Af21 and Af26, which consists largely of red and deep sandy soils. There are no high potential soils present within the grid connection corridor, and the soils are of moderate potential at best due mainly to a combination of the shallow depth and the sandy texture which will lead to rapid water infiltration and the soils drying out.

In addition, the low rainfall in the area means that there is little potential for rain-fed arable agriculture in the area. Arable production would, therefore, be possible only by irrigation, and no indications of any irrigated areas within, and surrounding the grid connection corridor, can be identified.

In general, the soils that do occur within the grid connection corridor and the surrounding area are suited for extensive grazing at best and the grazing capacity of the area is very low, at around 26-40 ha/large stock unit.

The soils present within the grid connection corridor are not considered susceptible to erosion by water. However, if the vegetation cover is disturbed (for example by overgrazing and construction activities) and considering the sandy nature of the topsoils, as well as the dry climate, there is a significant possibility of removal of some or all of the topsoil by wind action.

8.6.2 Description of Soil and Agricultural Potential Impacts

Two impacts have been identified to be associated with the development of the Geelstert Grid Connection from a soils and agricultural potential perspective:

Loss of agricultural land

In most environmental investigations, the major impact on the natural resources of the grid connection corridor would be the loss of potential agricultural land due to the construction and installation of the power line, collector substation and associated infrastructure. However, in this instance, there is no evidence of any cultivation in the vicinity, so this impact would be of extremely limited significance and would be local in extent, if at all.

Soil erosion

In this area, the sandy soils, coupled with the dry climate, means that a possible impact would be the increased risk of wind erosion of the topsoil when vegetation cover is removed or disturbed. This would be especially relevant for the construction of the access road and the collector substation.

8.6.3 Impact tables summarising the significance of impacts on Soil and Agricultural Potential during construction (including decommissioning) and operation (with and without mitigation)

Construction and Operation Phase Impacts

Nature: *Loss of potentially productive agricultural land* The loss of productive agricultural land could potentially occur during the construction phase but would be limited due to the corridor not containing high potential land and the grid connection infrastructure being of a limited extent.		
	Without mitigation	**With mitigation**
Extent	Low (1)	Low (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (18)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Minimise the footprint of construction as much as possible.		
Residual: Likely to be low since the implementation of the appropriate mitigation measures will enable more or less complete rehabilitation during and the life of the project.		

Nature: *Increased soil erosion hazard by wind* Increased soil erosion is expected to occur due to the disturbance of the soil during the construction and operation phase (i.e. maintenance on the power line)		
	Without mitigation	**With mitigation**
Extent	Local to Regional (3)	Low (1)
Duration	Permanent (5)	Short-term (2)
Magnitude	High (8)	Minor (2)

Probability	Highly probable (4)	Improbable (2)
Significance	**High (64)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Very possible	No
Can impacts be mitigated?	Yes	
Mitigation: » Minimise the footprint of construction and disturbance during maintenance as much as possible. » Where soil is removed/disturbed, ensure it is stored for rehabilitation and re-vegetated as soon as possible. » Implement all appropriate soil conservation measures, including contouring, culverts etc. (for road construction), geotextiles and slope stabilisation (for all infrastructure).		
Residual: If mitigation is not carried out, long-term wind erosion, with results such as loss of valuable topsoil, may occur.		

Decommissioning Phase Impacts

During the decommissioning phase the same potential impacts, as identified for the construction phase, are expected. The same impacts, significance ratings and mitigation measures are applicable. Therefore, decommissioning impacts in terms of soils and agricultural potential are not further considered.

8.6.4 Implications for Project Implementation

With the implementation of mitigation measures by the proponent, contractors, and operational staff, the significance of the impacts associated with the Geelstert Grid Connection are expected to be low. From the outcomes of the Soils Impact Assessment, it is concluded that the Geelstert Grid Connection can be developed and impacts on soils managed by taking the following into consideration:

» Implement all appropriate soil conservation measures, including contouring, culverts etc. (for road construction), geotextiles and slope stabilisation (for all infrastructure).

8.7. Assessment of Impacts on Heritage Resources

The Heritage Report (refer to **Appendix H** and **Appendix H1** of the final BA Report) has shown that it is unlikely that the development of the Geelstert Grid Connection will have a negative impact, or an impact of high or medium significance, on archaeological and palaeontological resources. This is based on the findings that there are no significant heritage features or resources present within the grid connection corridor.

8.7.1 Results of the Heritage Report (including archaeology and palaeontology)

Based on previous heritage impact assessments undertaken in the surrounding area of the grid connection corridor for other renewable energy facilities and associated grid connection infrastructure, it is unlikely that the Geelstert Grid Connection will have an impact on significant heritage resources. However, the following impacts of a low significance have been identified for the construction phase of the Geelstert Grid Connection:

» An impact on archaeological, built environment and palaeontological heritage resources which may be impacted by the construction of the Geelstert Grid Connection; and

» An impact on palaeontological resources within the vicinity of the grid connection which may be impacted by the construction of the Geelstert Grid Connection.

The Heritage Report (**Appendix H** and **Appendix H1**) concluded that there are no known graves within the grid connection corridor and no built heritage sites of a high significance. In addition, the lithologies within the Aggeneys area are generally of igneous origin, which have been highly metamorphosed (unfossiliferous) as a result of the Namaqua-Natal orogenic event, therefore from a palaeontological perspective these rocks are of little interest.

From the outcomes of the Heritage Screener, the development of the Geelstert Grid Connection is considered acceptable from a heritage perspective within the assessed grid connection corridor.

8.7.2 Description of the Heritage Impacts

Impacts on heritage resources (including archaeology and palaeontology) will occur mainly during the construction phase of the Geelstert Grid Connection. These impacts are described below:

Impacts on Archaeology

A number of archaeological sites are known to occur from the landscape surrounding the grid connection corridor. These sites are however located outside of the grid connection corridor and are therefore unlikely to be impacted by the development of the Geelstert Grid Connection.

Impacts on Palaeontology

Various palaeontological assessments undertaken within the vicinity of the grid connection corridor and the surrounding landscape indicated that the lithologies underlying the Aggeneys area are unfossiliferous and of no palaeontological interest.

8.7.3 Impact tables summarising the significance of impacts on heritage during the construction (including decommissioning) phase (including with and without mitigation)

Construction Phase Impacts

Nature: *Significant archaeological and built environment resources may be impacted by the construction phase of the proposed development.* A number of archaeological sites are known from the surrounding area; however, these sites are located well outside of the grid connection corridor for the Geelstert Grid Connection		
	Without mitigation	**With mitigation**
Extent	Local (1)	Not Applicable (N/A)
Duration	Permanent (5)	
Magnitude	Low (1)	
Probability	Improbable (1)	
Significance	**Low (7)**	
Status (positive or negative)	Neutral	
Reversibility	Any impacts on heritage resources that do occur are irreversible.	
Irreplaceable loss of resources?	Possible	
Can impacts be mitigated?	Yes	
Mitigation:		

- A person must be trained as a site monitor to report any archaeological sites found during the project life cycle. Construction managers/Foremen and/or the Environmental Control Officer (ECO) should be informed before construction starts on the possible types of heritage sites and cultural material that they may encounter and the procedures to be followed when they find sites.
- If concentrations of historical and pre-colonial archaeological heritage material and/or human remains (including graves and burials) are uncovered during construction, all work must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) so that systematic and professional investigation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collections of the pre-colonial shell middens and associated artefacts will then be conducted to establish the contextual status of the sites and possibly remove the archaeological deposit before development activities continue.

Residual:

- Loss of scientific information should heritage resources be destroyed.

Nature: *Impact on palaeontological resources*

Various palaeontological assessments have noted that the bedrock in the general area and the affected area is underlain by unfossilferous and is of no palaeontological interest. The grid connection corridor for the Geelstert Grid Connection is associated with a low palaeosensitivity as shown by the SAHRIS Palaeosensitivity Map.

	Without mitigation	**With mitigation**
Extent	Local (1)	Not Applicable (N/A)
Duration	Permanent (5)	
Magnitude	Low (1)	
Probability	Improbable (1)	
Significance	**Low (7)**	
Status (positive or negative)	Neutral	
Reversibility	Any impacts on heritage resources that do occur are irreversible.	
Irreplaceable loss of resources?	Possible	
Can impacts be mitigated?	Yes	

Mitigation:

- Any substantial fossil remains (e.g. vertebrate bones and teeth, shells) encountered during excavation should be reported to SAHRA for possible mitigation by a professional palaeontologist (Contact Details: SAHRA, 111 Harrington Street, Cape Town, PO Box 4637, Cape Town 8000, South Africa. Phone +27(0)21 462 452 and Fax +27(0) 21 462 4509 (www. sahra.org.za).
- Should substantial fossil remain such as vertebrate bones and teeth, plant-rich fossil lenses, fossil wood or dense fossil burrow assemblages be exposed during construction, the responsible ECO/EO/Environmental Representative should safeguard these, preferably in situ, and alert SAHRA, i.e. The South African Heritage Resources Authority, as soon as possible (Contact details: Mr P. Hine P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: cscheermeyer@sahra.org.za) so that appropriate action can be taken by a professional palaeontologist, at the Proponent's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a suitably qualified palaeontologist. If mitigation is not carried out, long-term wind erosion, with results such as loss of valuable topsoil, may occur.

Residual:

- Loss of scientific information should fossils resources be destroyed.

Decommissioning Phase Impacts

During the decommissioning phase the same potential impacts, as identified in the construction phase, are expected. The same impacts, significance ratings and mitigation measures are applicable. Therefore, decommissioning impacts in terms of heritage are not further considered.

8.7.4 Implications for Project Implementation

With the implementation of mitigation measures by the proponent, contractors, and operational staff, the significance of the heritage impacts of the Geelstert Grid Connection will be low. No impacts of a medium or high significance were identified from a heritage perspective. As a result, the development of the Geelstert Grid Connection is considered to be acceptable. Any potential impacts can be managed by taking the following into consideration:

» If any archaeological or palaeontological material or human burials are uncovered during the construction phase, work within the immediate area of the heritage or fossil find must cease and SAHRA or other local authority in accordance with the National Heritage Resources Act (Act No. 25 of 1999) of 1999 should be contacted.
» The Fossil Chance Find Procedure/Protocol (included in the EMPr as **Appendix C**) should be implemented for the construction (including decommissioning) phase and operation phase of the Geelstert Grid Connection.

8.8. Assessment of Visual Impacts

Negative impacts on visual receptors will occur during the construction and operation of the Geelstert Grid Connection. The potential visual impacts are summarised below (also refer to **Appendix I** and **Appendix I1**).

8.8.1 Results of the Visual Impact Assessment

The fact that the terrain is relatively flat will mean that the grid connection infrastructure is likely to be viewed in profile by all identified receptors within the area. Due to the grid connection corridor running parallel to an existing power line servitude (i.e. Aries/Aggeneis 400kV Power Line) for majority of its length, the development of the Geelstert Grid Connection will likely have a low impact in terms of intensifying the visual influence of grid connection infrastructure within the developed landscape character area.

Due to its tourism importance, the N14 is likely to be one of the most sensitive visual receptors. The grid connection corridor only affects the N14 for 8km from the connection point at the Aggeneis MTS, and because views from this section of the road are already impacted by existing power lines (i.e. Aries/Aggeneis 400kV Power Line) and the Black Mountain Mine operations, the visual impact is of a low significance.

The Loop 10 road runs parallel to the northern boundary of the grid connection corridor. From this road, the Geelstert Collector Substation will be viewed behind the authorised Aggeneys 1 and Aggeneys 2 solar PV facilities and collector substation, as well as other grid connection infrastructure (i.e. Aries/Aggeneis 400kV Power Line, etc.). The Geelstert Grid Connection will be viewed at a distance of approximately

1.5km from this road and will be partly screened by the solar PV panel arrays of the authorised Aggeneys 1 and Aggeneys 2 solar PV facilities.

There is only one homestead that could potentially be affected by the views of the Geelstert Grid Connection within the surrounding area. The homestead is located 2.7km to the north-east of the grid connection corridor and north of the Loop 10 Road. From this distance, views of the Geelstert Grid Connection (including the collector substation) will be possible, however the grid connection infrastructure will be viewed in the context of the Aggeneys 1 and Aggeneys 2 solar PV projects, as well as the existing Aries/Aggeneis 400kV Power Line which at its closest is located 200m south of homestead and is highly obvious. Howdver, the homestead appeared to be vacant.

Aggeneys is the only settlement in the vicinity of the gird connection corridor, and the power line is likely to be visible from this area. However, the Geelstert Collector Substation is located in excess of 10km from the town of Aggeneys and is highly unlikely to be visible.

The Zone of Theoretical Visibility (ZTV) for the Geelstert Grid Connection is included in **Figure 8.6**.

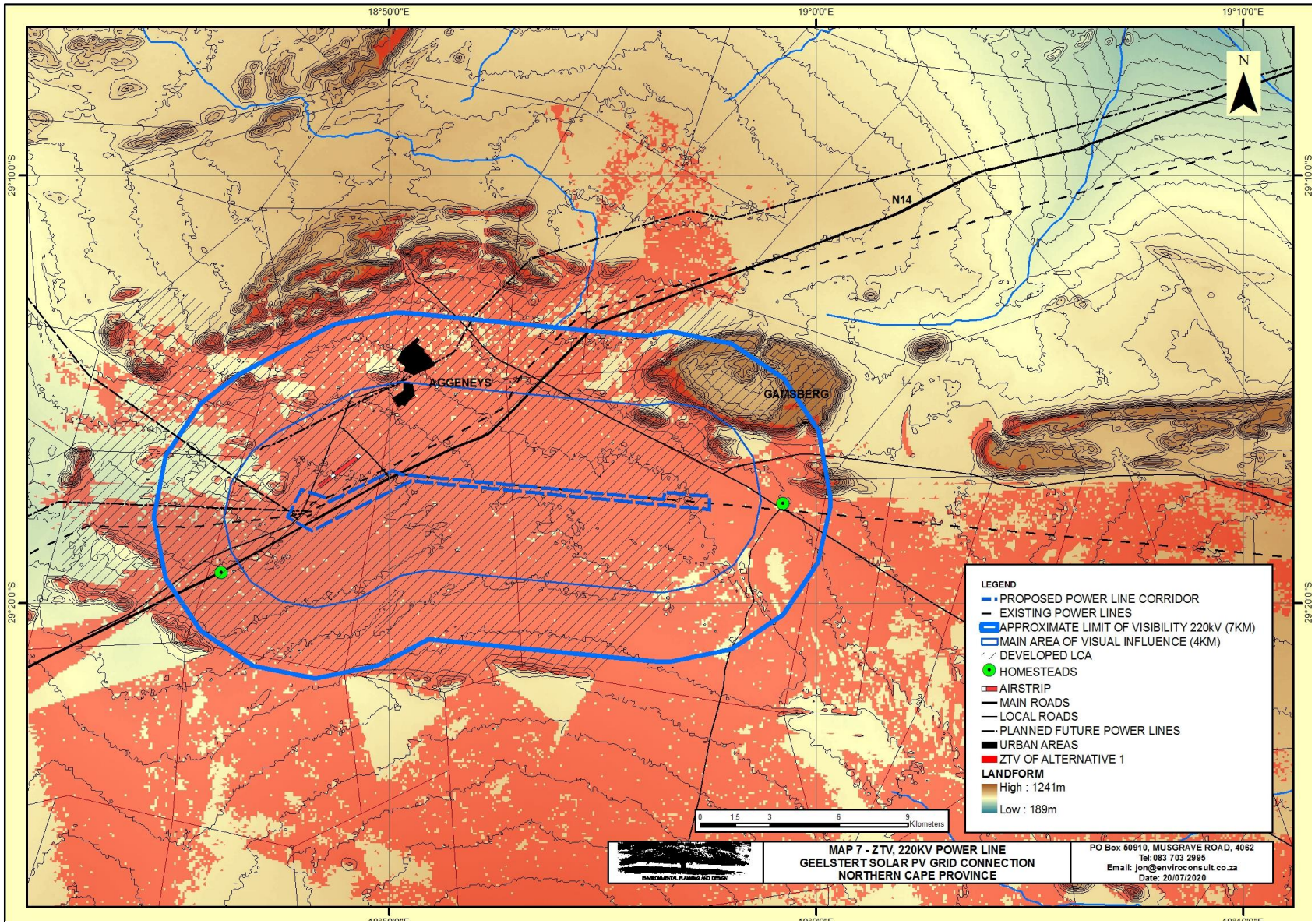

Figure 8.6: Zone of Theoretical Visibility Map for the Geelstert Grid Connection.

8.8.2 Description of the Visual Impacts

Visual impacts will occur during the construction and operation phases of the Geelstert Grid Connection. The following potential visual impacts are assessed for the development of the grid connection infrastructure.

The proposed development could change the general landscape character.
The grid connection infrastructure is anticipated to affect the views of the entire area from which it is likely to be visible during the construction and operation phases.

The proposed development could change the character of the landscape as seen from the N14.
The grid connection infrastructure is likely to affect the views of the travellers along the N14 for a distance of approximately 8km. Due to the presence of existing grid connection infrastructure within the area of the N14 that will be affected by views of the Geelstert Grid Connection, this impact is associated with a low significance.

The proposed development could change the character of the landscape as seen from the Loop 10 Road
The grid connection infrastructure is likely to affect the views of the travellers along the Loop 10 Road, however the project will be viewed in the context of the authorised Aggeneys 1 and Aggeneys 2 solar PV facilities and associated infrastructure. From this road, the power line for the Geelstert Grid Connection will be at a distance of approximately 1.5km. Due to the lack of high traffic volumes on this road, this impact is associated with a low significance.

The proposed development could change the character of the landscape as seen from local homesteads
There is only one homestead that could potentially be affected by the views of the Geelstert Grid Connection within the surrounding area. The homestead does not appear to be occupied, however there are stock pens surrounding the building. As a result, it is a possibility that owners of the homestead may not be interested in the visual aesthetics of the area, but the productivity of the land. Taking into consideration existing views from this homestead of the existing Aries/Aggeneis 400kV Power Line, the development of the Geelstert Grid Connection is likely to result in a smaller impact compared with the views of this power line. As a result, this impact is associated with a low significance.

The proposed development could change the character of the landscape as seen from the settlement of Aggeneys
Aggeneys is the only settlement in the vicinity of the gird connection corridor, and the proposed power line is likely to be visible from this area. However, the Geelstert Collector Substation is located in excess of 10km from the town of Aggeneys. It is therefore highly unlikely that the collector substation will be visible. Considering that the area is already impacted by views of the existing mining operations and grid connection infrastructure, the addition of the Geelstert Grid Connection will negligibly intensify the views in the area, however given the distance from the settlement to the grid connection corridor, this impact is associated with a low significance.

8.8.3 Impact table summarising the significance of visual impacts during construction, operation and decommissioning (with and without mitigation)

Construction and Operation Phase Impacts

Nature: *Impact of the proposed development on the general landscape character*
The proposed Geelstert Grid Connection corridor will largely affect the Developed Landscape Character Area (LCA).

Within the Developed LCA however there are areas where the grid connection infrastructure is more obvious than others. The section of the Loop 10 Road between the proposed Geelstert 1 and Geelstert 2 solar PV facilities and the N14 is a case in point, electrical infrastructure is visible from this road, but it is not obvious.

Electrical infrastructure is obvious from the section of the N14 between its junction with the Loop 10 Road and the location that the existing Aries/Aggeneis 400kV Power Line joins the N14 but the scale is relatively small as larger power lines are some distance from the road.

Between the point that the existing Aries/Aggeneis 400kV Power Line joins the N14 and the Aggeneis MTS, larger infrastructure gradually converges and becomes far more obvious from the road.

Due to the nature of the proposed grid connection infrastructure and the fact that the majority of the affected area is also currently impacted by existing development and future planned electrical infrastructure, the magnitude of the impact of is assessed as low.

	Without mitigation	**With mitigation**
Extent	Immediate surroundings (2)	Immediate surroundings (2)
Duration	Long term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (24)**
Status (positive or negative)	The intensity of development within the Developed LCA is likely to intensify particularly in areas where development and particularly electrical infrastructure is not as obvious. Within these areas the impact is more likely to be seen as negative. In areas where grid connection infrastructure is more pronounced, particularly closer to the Aggeneis MTS, the impact is less likely to be seen in a negative light.	Neutral – Negative
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes, to a small degree but it will not significantly affect the level of impact.	

Mitigation:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude to reduce the extent of a scarring effect in the landscape.
» Ensure that vegetation is not unnecessarily removed during the construction period to ensure erosion control and to reduce the extent of a scarring effect in the landscape.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.

» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
Residual Impacts:
Lack of rehabilitation on decommissioning could result in degraded areas.

Nature: *Change in the character of the landscape as seen from the N14*

The section of the N14, which will be affected by the Geelstert Grid Connection, runs through the Developed LCA.

Due to distance, the grid connection corridor will have the most significant influence on views from this receptor. The proposed Geelstert Collector Substation being located approximately 7.6km from the road will have negligible influence.

Grid connection infrastructure is obvious from the section of the N14 between its junction with the Loop 10 Road and the location that the existing Aries/Aggeneis 400kV Power Line joins the N14 but the scale is relatively small as larger power lines are some distance from the road.

Between the point that the existing Aries/Aggeneis 400kV Power Line crosses the N14 and the Aggeneis MTS, larger infrastructure gradually converges on the MTS and becomes closer to and more obvious from the road.

	Without mitigation	**With mitigation**
Extent	Immediate surroundings (2)	Immediate surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Small to Minor (1)	Small to Minor (1)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (14)**	**Low (14)**
Status (positive or negative)	The intensity of development within the Developed LCA is likely to intensify particularly in areas where development and electrical infrastructure is not as obvious. The affected area is one of the areas within the surrounding area that is least affected by development in general and particularly by electrical infrastructure. Neither the power line nor the Geelstert Collector Substation is likely to be obvious from this road and so the impact is likely to have a neutral consequence.	Neutral
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes, but this is highly unlikely to change the level of impact.	

Mitigation:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.

Residual Impacts:
Lack of rehabilitation on decommissioning could result in degraded areas.

Nature: *Impacts of the grid connection infrastructure on views from the local homesteads*

There is only one homestead that could potentially be affected that is located approximately 2.7km to the east of the eastern end of the grid connection corridor.

From this distance the power line and collector substation are both likely to be obvious. It will however be viewed in the context of the authorised Aggeneys 1 and Aggeneys 2 solar PV facilities as well as the existing Aries/Aggeneis 400kV Power Line that is located within approximately 200m and is highly obvious from the homestead.

The homestead does not appear to be inhabited, however, stock pens surrounding the building appear to be well used. It is likely therefore that the owners may be more concerned with agricultural production than aesthetics. Taking into account the nature of the homestead and the nature of existing views, the Geelstert Grid Connection will add to existing visual influence of infrastructure, however this additional impact is likely to be relatively small compared with existing impact and it is highly unlikely to impact on the current uses.

	Without mitigation	**With mitigation**
Extent	Immediate surroundings, (2)	Immediate surroundings, (2)
Duration	Long term, (4)	Long term, (4)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable, (2)	Improbable, (2)
Significance	**Low (16)**	**Low (16)**
Status (positive or negative)	Neutral, due to distance, the relatively low level of impact and the likelihood that the homestead is uninhabited it is unlikely that the impact will be seen in a negative light.	Neutral
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes, to a small degree but it will not significantly affect the level of impact.	

Mitigation:

- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- Ensure that vegetation is not unnecessarily removed during the construction period.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.

Residual Impacts:
Lack of rehabilitation on decommissioning could result in degraded areas.

Nature: *The impact of the proposed power line on views from the settlement of Aggeneys*

Due to the density of development and vegetation within the settlement, the power line is only likely to be visible from the southern edge of Aggeneys.

At its closest, the grid connection corridor is located approximately 2.6km from the settlement. The collector substation is located in excess of 10km from the settlement and is highly unlikely to be visible and will not have an impact on Aggeneys.

The landscape between Aggeneys and the grid connection corridor is already heavily impacted by electrical infrastructure which means that the view from the urban edge is already highly industrialised. The addition of a new power line will slightly intensify this influence but given the distance this is likely to be a relatively minor addition to an existing impact.		
	Without mitigation	**With mitigation**
Extent	Immediate surroundings, (2)	Immediate surroundings, (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Small to Minor (1)	Small to Minor (1)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (14)**	**Low (14)**
Status (positive or negative)	Due to the nature of the surrounding landscape which is heavily industrialised and the relatively insular nature of the settlement it is unlikely that the impact will be seen in a negative light, therefore this impact is neutral.	Neutral – Negative
Irreplaceable loss of resources?	No irreplaceable loss of resources	No irreplaceable loss of resources
Can impacts be mitigated?	Yes, to a small degree but it will not significantly affect the level of impact.	
Mitigation: » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. » Ensure that vegetation is not unnecessarily removed during the construction period. » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities. » Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.		
Residual Impacts: Lack of rehabilitation on decommissioning could result in degraded areas.		

Decommissioning Phase Impacts

During the decommissioning phase the same potential impacts, as identified in the construction phase, are expected. The same impacts, significance ratings and mitigation measures are applicable. Therefore, decommissioning impacts in terms of visual impacts is not further considered.

8.8.4 Implications for Project Implementation

Overall, the significance of the visual impacts is expected to be low, following the implementation of the recommended mitigation measures. From the outcomes of the Visual Impact Assessment, it is concluded that the development of the Geelstert Grid Connection is acceptable. No impacts of a high or medium significance were identified and no fatal flaws from a visual perspective are associated with the development of the Geelstert Grid Connection.

8.9. Assessment of Social Impacts

Potential social impacts and the relative significance of the impacts associated with the development of the Geelstert Grid Connection are summarised below (refer to **Appendix J**). Both positive and negative social impacts are expected to occur with the development of the Geelstert Grid Connection.

8.9.1 Results of the Social Impact Assessment

The majority of social impacts associated with the development of the Geelstert Grid Connection will have a short-term duration associated with the construction phase of the project. Of these impacts all can be mitigated to acceptable levels and there are no fatal flaws associated with the construction of the project.

Although the development of the Geelstert Grid Connection is likely to change the sense of place of the area during the operation phase, it will also have significant benefits in respect of enabling the supply of renewable energy into a grid system heavily reliant on coal powered technology. In this sense the project forms part of a national effort to reduce South Africa's carbon emissions and therefore carries with it a significant benefit.

8.9.2 Description of Social Impacts

During the construction and operation phases of the Geelstert Grid Connection, both positive and negative impacts are expected to occur.

The positive and negative social impacts identified and assessed for the construction phase include:
» Direct and indirect employment opportunities
» Economic multiplier effects
» Influx of jobseekers and change in population
» Safety and security impacts
» Impacts on daily living and movement patterns
» Nuisance impacts, including noise and dust
» Visual impacts and sense of place impacts

The positive and negative social impacts identified and assessed for the operation phase include:
» Direct and indirect employment opportunities
» Visual impact and sense of place impacts
» Impacts associated with the loss of agricultural land

8.9.3 Impact tables summarising the significance of social impacts during construction, operation and decommissioning (with and without mitigation measures)

Construction Phase Impacts

Nature: *The creation of direct and indirect employment opportunities during the construction phase of the project.*
It is anticipated that the construction of the Geelstert Grid Connection will result in the creation of approximately 130 employment opportunities at the peak of construction, comprising a mixture of skilled, semi-skilled, and low-skilled opportunities. Employment opportunities generated as a result of the project will be temporary in nature and will last for the duration of the construction period (i.e. 12 months). The majority of the general labour force will, as far as possible, be sourced from the local labour pool, providing employment opportunities to residents of communities surrounding the project (where the required skill sets are available). Where relevant skills are unavailable from the local labour pool, these would need to be sought elsewhere. The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area.

A number of indirect employment opportunities will also be created. Indirect employment opportunities will

predominantly be created in the service industry, through the opportunity for the provision of secondary services to the construction team. Services may include, but are not limited to, accommodation, transportation, catering, and laundry services.

Skills development will also be undertaken as part of the construction phase. The skills development will broaden the skills of employees associated with the project and enable possible future opportunities where these become available.

	Without enhancement	**With enhancement**
Extent	Local- Regional (3)	Local- Regional (3)
Duration	Short term (1)	Short term (1)
Magnitude	Minor (2)	Low (2)
Probability	Highly probable (4)	Definite (5)
Significance	**Low (24)**	**Medium (30)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes (enhanced)	

Enhancement:

» A local employment policy must be adopted to maximise opportunities made available to the local labour force.
» Labour must be sourced from the local labour pool where possible. If the necessary skills are unavailable, labour should be sourced from (in order of preference) the greater Khâi-Ma LM, Namakwa DM, Northern Cape Province, South Africa, or elsewhere. Where required, training and skills development programmes must be initiated prior to the commencement of the construction phase.
» Labour force suppliers must as far as possible be sourced locally.
» Where feasible local suppliers and contractors, that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria, must be used as far as possible to ensure that the benefits resulting from the project accrue as far as possible to the local communities which are also likely to be most significantly impacted / affected by the project.
» The recruitment selection process must seek to promote gender equality and the employment of women wherever possible.
» Proof of skills development must be provided to the upskilled individual.

Residual impacts:

» Improved pool of skills and experience in the local area.
» Improved overall quality of life.
» Economic growth for small-scale entrepreneurs.

Nature: *Significance of the impact from the economic multiplier effects from the use of local goods and services.*

There are likely to be opportunities for local businesses and service providers to provide services and materials, and in doing so benefit from the construction phase of the Geelstert Grid Connection. Off-site accommodation in the nearest town (Aggeneys), and smaller settlements, may be required for contract workers and certain employees. The economic multiplier effects from the use of local goods and services will include, but is not limited to, construction materials and equipment, and workforce essentials such as catering, trade clothing, safety equipment, accommodation, transportation and other goods.

In terms of business opportunities for local companies, expenditure during the construction phase will create business opportunities for the regional and local economy. The increase in demand for new materials and services in the nearby area may stimulate local business and local economic development. There is likely to be a direct increase in industry and indirect increase in secondary businesses where gaps in the market open up.

	Without enhancement	**With enhancement**

Extent	Local- Regional (3)	Local- Regional (3)
Duration	Short term (1)	Short term (1)
Magnitude	Minor (2)	Low (4)
Probability	Probable (3)	Highly Probable (4)
Significance	**Low (18)**	**Medium (32)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes (enhanced)	

Enhancement:

» A local procurement policy must be adopted to maximise the benefit to the local economy and the existing local SMMEs.

» A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g. construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) must be created and companies listed thereon must be invited to bid for project-related work where applicable.

» Local procurement must be encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.

Residual impacts:

» Improved local service sector, growth in local business.

Nature: *In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure.*

An influx of people looking for employment or other economic opportunities could result in increased pressure being placed on economic and social infrastructure, and a change in the local population. Population change refers to the size, structure, density as well as demographic profile of the local community.

An influx of jobseekers into an area, could lead to a temporary increase in the level of crime, cause social disruption (including an increase in HIV and AIDS and unwanted pregnancies) and put pressure on basic services. This includes municipal services such as sanitation, electricity, water, waste management, health facilities, transportation and the availability of housing. It could also potentially create conflict between locals and outsiders due to potential differences in racial, cultural and ethnic composition. A further negative impact that could result due to an influx of jobseekers into an area is an increase in unemployment levels due to an oversupply of available workforce, particularly with respect to semi- and unskilled workers.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Minor (2)	Small (0)
Probability	Probable (3)	Improbable (2)
Significance	**Low (12)**	**Low (4)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

- Develop and implement a recruitment protocol in consultation with the municipality and local community leaders. Ensure that the procedures for applications for employment are clearly communicated.
- Develop and implement a local procurement policy which prioritises "locals first" to prevent the movement of people into the area in search of work.
- Engage with local community representatives prior to construction to facilitate the adoption of the "local's first" procurement policy.
- Provide transportation for workers (from towns such as Aggeneys and others) to ensure workers can easily access their place of employment and do not need to move closer to the site.
- Compile and implement a grievance mechanism.
- Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour.
- Prevent the recruitment of workers at the site.
- Implement a method of communication whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
- Establish clear rules and regulations for access to the proposed site.
- Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours.
- Inform local community organisations and policing forums of construction activities and times and the duration of the construction phase.

Residual impacts:

- Possibility of outside workers remaining in the area after construction is completed and subsequent pressures on local infrastructure, resources, and services.

Nature: *Temporary increase in safety and security concerns associated with the influx of people during the construction phase.*

The commencement of construction activities can be associated with an increase in crime within an area. The perceived loss of security during the construction phase of a project due to an influx of workers and / or outsiders to the area (as in-migration of newcomers, construction workers or jobseekers are usually associated with an increase in crime), may have indirect effects such as increased safety and security concerns for neighbouring properties, damage to property, increased risk of veld fire, stock theft, poaching, crime and so forth.

The labour force will not permanently reside within the area or have any reason to be on-site after hours.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (36)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

- Working hours must be kept within daylight hours during the construction phase.
- Employees must be easily identifiable and must adhere to the security rules of the site.
- Provide transportation for workers (from towns such as Aggeneys and others) to ensure workers do not need to move closer to the site.
- The perimeter of the construction site must be appropriately secured to prevent any unauthorised access to the site. The fencing of the site must be maintained throughout the construction and operation phases.
- The appointed EPC contractor must appoint a security company and implement appropriate security procedures

and measures.
» Access in and out of the construction site must be strictly controlled by a security company appointed for the project.
» A Community Liaison Officer (CLO) must be appointed to implement a grievance mechanism. A communication protocol must be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
» A stakeholder management plan must be implemented by the EPC contractor to address neighbouring farmer concerns regarding safety and security.

Residual impacts:
» Residual impacts related to losses through crime and lasting damage to properties.

Nature: *Temporary increase in traffic disruptions and movement patterns during the construction phase*.
Project components and equipment will be transported to site using road transport. The N14 national road provides the primary access to the corridor, and can also be accessed via the Loop 10 and Gamoep gravel roads. The Loop 10 gravel road is used by the mines in the area which includes heavy vehicles. Local farmers utilise the gravel access roads to access their farms and the surrounding areas.

Increased traffic due to construction vehicles could cause disruptions to the local community and increase safety hazards. The use of local roads and transport systems may cause road deterioration and congestion. This impact could be magnified since roads of a gravel nature are not necessarily designed to carry heavy traffic and are prone to erosion, except where these roads are used and maintained by the mining companies in the area. Noise, vibrations, dust and visual pollution from heavy vehicle traffic during the construction phase could also negatively impact local residents and road users.

Where specific land use activities are being undertaken on affected and adjacent properties, these may be impacted. This could impact land use of portions of the affected property for agricultural activities (i.e. grazing), as well as affected and surrounding landowners which use their properties for livestock grazing, game farming and mining activities.

	Without mitigation	**With mitigation**
Extent	Local-Regional (3)	Local (2)
Duration	Short term (1)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:
» Working hours must preferably be restricted to daylight hours during the construction phase. Where deviation of the working hours is required it must be approved by the relevant authorities and surrounding landowners must be notified.
» All vehicles must be road worthy and drivers must be licensed, obey traffic rules, follow speed limits and made aware of the potential road safety issues.
» Construction vehicles should be inspected regularly by the EPC contractor to ensure their road worthiness.
» Adequate and strategically placed traffic warning signs and control measures must be implemented along the N14 and gravel access roads (including the Loop 10 and Gamoep gravel roads) to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be visible at all times, and especially at night. Signage must be maintained throughout the construction phase.
» Implement penalties for reckless driving as a way to enforce compliance to traffic rules.

- » Avoid heavy vehicle activity through residential areas during "peak" hours (when children are taken to school, people driving to work, etc.).
- » The developer and EPC contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed or damaged due to construction activities.
- » The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if damaged (i.e. wear and tear) due to construction activities.
- » A protocol communication must be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
- » Communication channels between the affected and surrounding landowners and the EPC contractor must be established.
- » Undertake information sessions with the surrounding communities prior to construction in order to ensure that communities are fully informed of the project to be developed in its final form. This must be undertaken through the appointment of a Community Liaison Officer (CLO).

Residual impacts:

- » None anticipated.

Nature: *Nuisance impacts in terms of temporary increase in noise and dust.*

Nuisance impacts associated with construction related activities include noise, dust, and possible disruption to adjacent properties and the land use activities being undertaken on the adjacent properties at the time of construction.

Site clearing activities increase the risk of dust and noise being generated, which can in turn negatively impact on adjacent properties, especially where noise sensitive land use activities are being undertaken. The movement of heavy construction vehicles, construction activities and operation of equipment also have the potential to create noise in the area, as well as along the N14 national road, and the Loop 10 and Gamoep gravel roads. The primary sources of noise during construction would be from construction equipment, vehicle and truck traffic. Noise levels can be audible over a large distance although are generally short in duration.

Dust would be generated from construction activities as well as trucks / vehicles driving on gravel access roads. This impact will negatively impact sensitive receptors within the vicinity of the construction activities. The impact of noise and dust on sensitive receptors can be reduced through the application of appropriate mitigation measures.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (44)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

- » The movement of heavy vehicles associated with the construction phase through populated areas must be timed to avoid weekends, public holidays, and holiday periods, where feasible.
- » Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
- » A speed limit of 45km/hr must be implemented on gravel roads. Should the speed limit be exceeded appropriate action must be taken against the offender of the rules.
- » Ensure all vehicles are road worthy, drivers are licensed and are made aware of the potential noise and dust issues.

» A CLO must be appointed. A method of communication must be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.

Residual impacts:

» Residual damage from construction activities.

Nature: *Intrusion impacts from construction activities will have an impact on the areas "sense of place".*

Intrusion impacts such as aesthetic pollution (i.e. building materials, construction vehicles, etc.), noise and light pollution will impact the "sense of place" for the local community and the surrounding landowners, specifically where land use activities sensitive to visual impacts and impacts on the "sense of place" are undertaken.

Construction related activities have the potential to negatively impact a local area's "sense of place", as well as the landscape character. Such an impact is likely to be present during the construction phase. It is however expected that the project will mostly affect areas and receptors that have already been exposed to other industrial infrastructure associated with the existing mining activities (i.e. for which the sense of place has already been altered).

Given the location of the Geelstert Grid Connection within an area characterised as having a low population density, and given the project's location within close proximity to existing mining activities and the associated infrastructure, the visual impact is anticipated to be of a low significance. This also includes consideration of the area's sense of place and landscape character from a social perspective.

The identification of the significance of the impact on sense of place for the construction phase was undertaken through the consideration of the Visual Impact Assessment (Environmental Planning and Design, 2020) undertaken for the project. The visual impact is expected to be of a low significance from a visual perspective due to the nature of the infrastructure and the fact that the majority of the affected area is also currently impacted by existing development and future planned electrical infrastructure. The Visual Impact Assessment has informed the visual impact from a social perspective.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Small (0)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (10)**	**Low (6)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

» Limit noise generating activities to daylight working hours and avoid weekends and public holidays.
» The movement of heavy vehicles associated with the construction phase must be timed to avoid weekends, public holidays and holiday periods where feasible.
» Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
» All vehicles must be road-worthy and drivers must be licensed and made aware of the potential road safety issues and need for strict speed limits.
» Communication, complaints and grievance channels must be implemented and contact details of the CLO must be provided to the local community in the study area.
» Ensure proper management and tidiness of the construction site.
» Implement the relevant mitigation measures as recommended in the Visual Impact Assessment.

Residual impacts:

» None anticipated.

Operation Phase Impacts

Nature: *The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy.*

During the operation phase, it is expected that very limited employment opportunities will be as the maintenance will be undertaken by Eskom according to scheduled and preventative maintenance regimes.

	Without enhancement	**With enhancement**
Extent	Local (1)	Local (1)
Duration	Short term (2)	Short term (2)
Magnitude	Small (0)	Small (0)
Probability	Probable (3)	Probable (3)
Significance	**Low (9)**	**Low (9)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	No, enhancement is relevant as Eskom employees will be utilised for the maintenance of the grid connection infrastructure.	
Enhancement: None		
Residual impacts: None		

Nature: *Visual impacts and sense of place impacts associated with the operation phase of the Geelstert Grid Connection.*

Given the location of the Geelstert Grid Connection within an area characterised as having a low population density, and given the project's location within close proximity to existing mining activities and the associated infrastructure, the visual impact is anticipated to be of a low significance. This also includes consideration of the area's sense of place and landscape character from a social perspective.

The identification of the significance of the impact on sense of place for the construction phase was undertaken through the consideration of the Visual Impact Assessment (Environmental Planning and Design, 2020) undertaken for the project. The visual impact is expected to be of a low significance from a visual perspective due to the nature of the infrastructure and the fact that the majority of the affected area is also currently impacted by existing development and future planned electrical infrastructure. The Visual Impact Assessment has informed the visual impact from a social perspective.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (18)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	

Irreplaceable loss of resources?	No
Can impacts be mitigated?	Yes

Mitigation:

» Maintain and manage the power line servitude to be in a good and neat condition to ensure that no degradation of the area takes place and impacts the visual quality of the area.
» Implement the relevant mitigation measures as recommended in the Visual Impact Assessment for the change in character and sense of place and landscape character.

Residual impacts:

» The visual impact of the Geelstert Grid Connection will remain until the infrastructure is completely decommissioned and removed. Thereafter the impact will be removed.

Nature: *Loss of agricultural land and overall productivity as a result of the operation of the proposed project on an agricultural property.*

The corridor of the Geelstert Grid Connection is located on sandy soils which are red and structureless with occasional dunes. In addition, there are no high agricultural potential soils present due to a combination of the sandy textures leading to rapid water infiltration.

The low rainfall in the area means that there is little potential for rain-fed arable agriculture in the area. Arable production would therefore be possible only by irrigation, and no indications of any irrigated areas is available within and surrounding the corridor.

Considering the agricultural potential of the site, the significance of the impact on the loss of agricultural land will be low from a social perspective.

The Soils Impact Assessment (ARC, 2020) was considered for the identification of the significance relating to the impact on loss of agricultural land.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (18)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

» Keep the project footprint as small as possible.
» Implement mitigation measures recommended by the soil's specialist.

Residual impacts:

» None expected to occur.

Decommissioning Phase

During the decommissioning phase the same potential impacts, as identified for the construction phase, are expected. The same impacts, significance ratings and mitigation measures are applicable. Therefore, decommissioning impacts in terms from a social perspective are not further considered.

8.9.4 Implications for Project Implementation

Following the implementation of the recommended enhancement measures, the significance of the positive social impacts during the construction phase will be medium. Negative social impacts for the construction phase will be low. During the operation phase, positive and negative social impacts will be low.

From the outcomes of the Social Impact Assessment, there are no fatal flaws associated with the proposed development. Therefore, the development of the Geelstert Grid Connection is acceptable from a social perspective. The following mitigation measures are however recommended:

- A Community Liaison Officer (CLO) must be appointed to assist with the management of social impacts and to deal with community issues, if feasible.
- Develop and implement a recruitment protocol in consultation with the municipality and local community leader. Ensure that the procedures for applications for employment are clearly communicated.
- It is recommended that local labour be sourced, wherever possible, to ensure that benefits accrue to the local communities. Efforts should be made to involve local businesses during the construction phase where possible.
- Local procurement of services and equipment is required, where possible, in order to enhance the multiplier effect.
- Involve the community in the project process as far as possible (encourage co-operative decision making and partnerships with local entrepreneurs).
- Employ mitigation measures to minimise the dust and noise pollution and damage to existing roads.
- Safety and security risks should be considered during the planning / construction phase of the proposed project. Access control, security and management should be implemented to limit the risk of crime increasing in the area.

8.10. Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e. no-go alternative) is the option of not constructing the Geelstert Grid Connection. Should this alternative be selected, there would be no environmental impacts on the proposed grid connection corridor since the project would not be developed. The implementation of the 'do-nothing' alternative will result in the solar PV facilities not being able to evacuate the generated electricity to the national grid and will, therefore, render the development of the associated solar PV facilities and the operation thereof not feasible.

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government due to competition in the sector, and the number of renewable energy projects being bid to Department of Mineral Resources and Energy (DMRE) as part of the REIPPPP. In addition, the Northern Cape Province will not benefit from additional generated power being evacuated through the proposed grid connection infrastructure directly into the Province's grid. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws or impacts of a high significance were identified to be associated with the development of the Geelstert Grid Connection. All impacts associated with the project can be mitigated to acceptable levels. If the Geelstert Grid Connection is not

developed the following impacts will not be realised, which are also associated with the Geelstert 1 and Geelstert 2 solar PV facilities:

a) Land use and agriculture

There are no high potential soils present within the grid connection corridor and the soils are of low potential at best due mainly to a combination of the depth and the sandy texture which will lead to rapid water infiltration and the soils drying out. In addition, the low rainfall in the area means that there is little potential for rain-fed arable agriculture in the area. Arable production would, therefore, be possible only by irrigation, and no indications of any irrigated areas within, and surrounding the grid connection corridor, can be identified.

The implementation of the 'do-nothing' alternative would leave the land-use restricted to the current land use (i.e. grazing), losing out on the opportunity to generate renewable energy in addition to current land use activities. Therefore, from a land-use perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of a viable and compatible land use for the broader study area which allows the current land-use activities to continue.

b) Socio-economic impact

Social: The impacts of pursuing the no-go alternative are both positive and negative as follows:

- The benefits would be that there is no disruption from an influx of jobseekers into the Aggeneys area, nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
- The agricultural potential of the grid connection corridor and the surrounding area is low, with no irrigation infrastructure present; therefore, the no-go option would be a lost opportunity for area to be used for an appropriate land use as a result of the solar resource availability over the area. Should the no-go option be considered, the low agricultural potential of the area will remain due to no irrigation infrastructure being present to warrant for the undertaking of commercial farming practices and the area having a low land capability.
- The main and current land use of the properties affected by the development of the grid connection infrastructure, is grazing activities which is not considered to be an effective land use and offers limited benefit and income to the landowners. Should the no-go option be considered and implemented, the landowners will lose an opportunity to commercially benefit from the operation of the renewable energy facilities and grid connection infrastructure within the area. In addition, should this option be selected, an opportunity would be lost to develop and implement a land use that will be more suited to the land and area.
- There would be an opportunity lost in terms of job creation, skills development and associated economic business opportunities for the local economy, as well as a loss of the opportunity to generate energy from a renewable resource without creating detrimental effects on the environment.

Foregoing the proposed development would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities at this location and within the surrounding area would be forfeited. Therefore, from a socio-economic perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of socio-economic benefits, when considering the current socio-economic conditions of the area.

Skills development: The establishment of the Geelstert Grid Connection will offer numerous opportunities for skills transfer and development. This is relevant for both on-site activities and manufacturing activities. Various PV facilities inclusive of grid connection infrastructure are proposed to be developed in the area, which is demarcated as a REDZ, and in the Northern Cape Province, which means that the transfer of skills from foreign experts to the local engineers and construction workers will take place, similar to what has taken place where PV facilities have been constructed and operated within the Province and the rest of the country. The skills training and transfer benefits for individuals within local communities would be forfeited with the implementation of the 'do-nothing' alternative.

As detailed above, the 'do-nothing' alternative will result in lost opportunities in terms of positive impacts as well as the loss of the opportunity to develop the Geelstert 1 and Geelstert 2 solar PV facilities. The negative impacts associated with the 'do nothing' alternative are considered to outweigh the positive impacts of this alternative. The 'do-nothing' alternative is, therefore, not preferred and not proposed (or recommended) to be implemented for the Geelstert Grid Connection.

CHAPTER 9: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 8, the development of the Geelstert Grid Connection may have effects (positive and negative) on natural resources, the social environment and on the people living within the surrounding area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with the Geelstert Grid Connection largely in isolation.

The grid connection corridor is proposed within the Northern Strategic Transmission Corridor and the Springbok Renewable Energy Development Zone (REDZ 8). The location of the grid connection corridor is in close proximity to a number of other proposed, approved, and operational grid connection infrastructure, which in some cases is associated infrastructure for other renewable energy developments within the area.

Existing grid connection infrastructure located within the surrounding area of the grid connection corridor include the existing Aries/Aggeneis 400kV; Aggeneis/Paulputs 220kV; and the Aggeneis/Nama 220kV power lines which connect into the Aggeneis MTS. The existing Aggeneis MTS is located 14km west of the Geelstert Collector Substation within the grid connection corridor and is the preferred gird connection point to the national grid for the proposed Geelstert 1 and Geelstert 2 solar PV facilities.

This chapter assesses the potential for the impacts associated with the Geelstert Grid Connection to become more significant when considered in combination with other known or proposed grid connection infrastructure projects within the area.

9.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the final Basic Assessment Report includes the following information required in terms of Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
3(j)(i) an assessment of each identified potentially significant impact and risk, including cumulative impacts.	The cumulative impacts associated with the development of the Geelstert Grid Connection are included and assessed within this chapter.

9.2 Approach taken to Assess Cumulative Impacts

The cumulative impacts that have the potential to be compounded through the development of the Geelstert Grid Connection in proximity to other similar developments include impacts such as those listed below. The role of the cumulative assessment is to test if such impacts are relevant to the grid connection infrastructure:

- Unacceptable loss of threatened or protected vegetation types, habitat or species through vegetation clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning;
- Unacceptable risk to avifauna through habitat loss, displacement and collisions with the power line;

- Unacceptable risk to freshwater features through disturbance associated with construction activities and increased run-off and erosion during the operation phase;
- Unacceptable loss of high agricultural potential areas presenting a risk to food security and increased soil erosion;
- Unacceptable loss of heritage resources (including palaeontological and archaeological resources);
- Complete or whole-scale change in sense of place and character of an area and unacceptable visual intrusion; and
- Unacceptable impact to socio-economic factors and components.

It is important to explore the potential for cumulative impacts as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by grid connection infrastructure developments throughout South Africa, while the significance of the cumulative impacts on visual amenity may only be influenced by grid connection infrastructure developments that are in close proximity to each other.

The identified grid connection corridor assessed for the Geelstert Grid Connection is located within a Renewable Energy Development Zone (REDZ 8) (i.e. the Springbok REDZ), and a Strategic Transmission Corridor (i.e. the Northern Transmission Corridor). These areas form part of the areas identified by the DEFF as geographical areas of strategic importance for the development of commercial renewable energy developments (REDZ) and large-scale grid infrastructure development projects (transmission corridors). Therefore, these areas are considered as nodes for the development of renewable energy and grid infrastructure projects.

Figure 9.1 indicates the location of other known and viable (proposed, approved and operational) associated grid connection infrastructure related to solar PV facilities, as well as existing grid infrastructure located within the vicinity of the Geelstert Grid Connection. The renewable solar energy projects located within the surrounding area were identified using the Department of Environmental Affairs Renewable Energy Database and current knowledge of projects being proposed in the area. Details of these renewable energy solar projects are provided in **Table 9.1.** All projects being considered have received approval from the Department of Environmental Affairs[21]. The potential for cumulative impacts is summarised in the sections that follow and has been considered within the specialist studies (refer to **Appendices D – J**).

Table 9.1: Other renewable solar energy projects / developments proposed, approved and operational within proximity of the Geelstert Grid Connection.

Project Name	Location	Project Status
Biotherm Aggeneys PV Solar Energy Facility (1 x 40MW PV)	Within Portion 1 of the Farm Aroams 57	Preferred Bidder Round 4 (Operational)

[21] Applications for Environmental Authorisation for numerous grid connection and renewable energy projects have been undertaken within the area, however some of these applications have lapsed and are no longer considered to be valid and are therefore not considered as part of the cumulative impact assessment.

Project Name	Location	Project Status
Biotherm Enamandla (4 x 75MW PV)	Within the Remaining Extent of the Farms Hartebeest Vlei 86	Approved
PVAfrica Zuurwater (5 x 75MW PV and 1 x 60MW PV)	Within Portion 3 of the Farm Zuurwater 62	Approved
Boesmanland Solar (1 x 75MW PV)	Within Portion 6 of the Farm Zuurwater 62	Approved
Black Mountain Mine Solar (1 x 19MW PV)	Within Portion 1 of the Farm Aggeneys 65	Approved
Geelstert 1 (1 x 125MW PV)	Within the Remaining Extent of the Farm Bloemhoek 61	In process
Geelstert 2 (1 x 125MW PV)	Within the Remaining Extent of the Farm Bloemhoek 61	In process
ABO Wind Aggeneys 1 (1 x 100MW PV)	Within the Remaining Extent of the Farm Bloemhoek 61	Approved
ABO Wind Aggeneys 2 (1 x 100MW PV)	Within the Remaining Extent of the Farm Bloemhoek 61	Approved

Existing grid connection infrastructure (i.e. power lines and substations) surrounding the Geelstert Grid Connection includes the Aries/Aggeneis 1 400kV Power Line; Aggeneis/Paulputs 1 220kV Power Line; Aggeneis/Harib 1 220kV Power Line; Aggeneis/Nama 1 220kV Power Line; Gamsberg/Midway 66kV Power Line; Aggeneys PV Solar Energy Facility 66kV Power Line; Midway Substation; Gamsberg Substation; Black Mountain Substation; Aggeneis Main Transmission Substation; and the Gamsberg/Midway 1 66kV Power Line.

It should be noted that not all the renewable energy projects and associated grid infrastructure projects presently under consideration by various developers will be built for operation. Not all proposed developments will be granted the relevant permits by the relevant authorities (DEFF, DMRE, NERSA and Eskom).

The cumulative impacts of the other known existing grid infrastructure and the proposed Geelstert Grid Connection are qualitatively assessed in this Chapter. The following potential impacts are considered:

- Cumulative impacts on ecological processes
- Cumulative impacts on freshwater features
- Cumulative impacts on avifauna
- Cumulative impacts on soil and agricultural potential
- Cumulative impacts on heritage resources
- Cumulative visual impacts
- Cumulative social impacts

In the sections below, the potential for cumulative impacts resulting from existing grid connection infrastructure within close vicinity of the assessed grid connection corridor are explored.

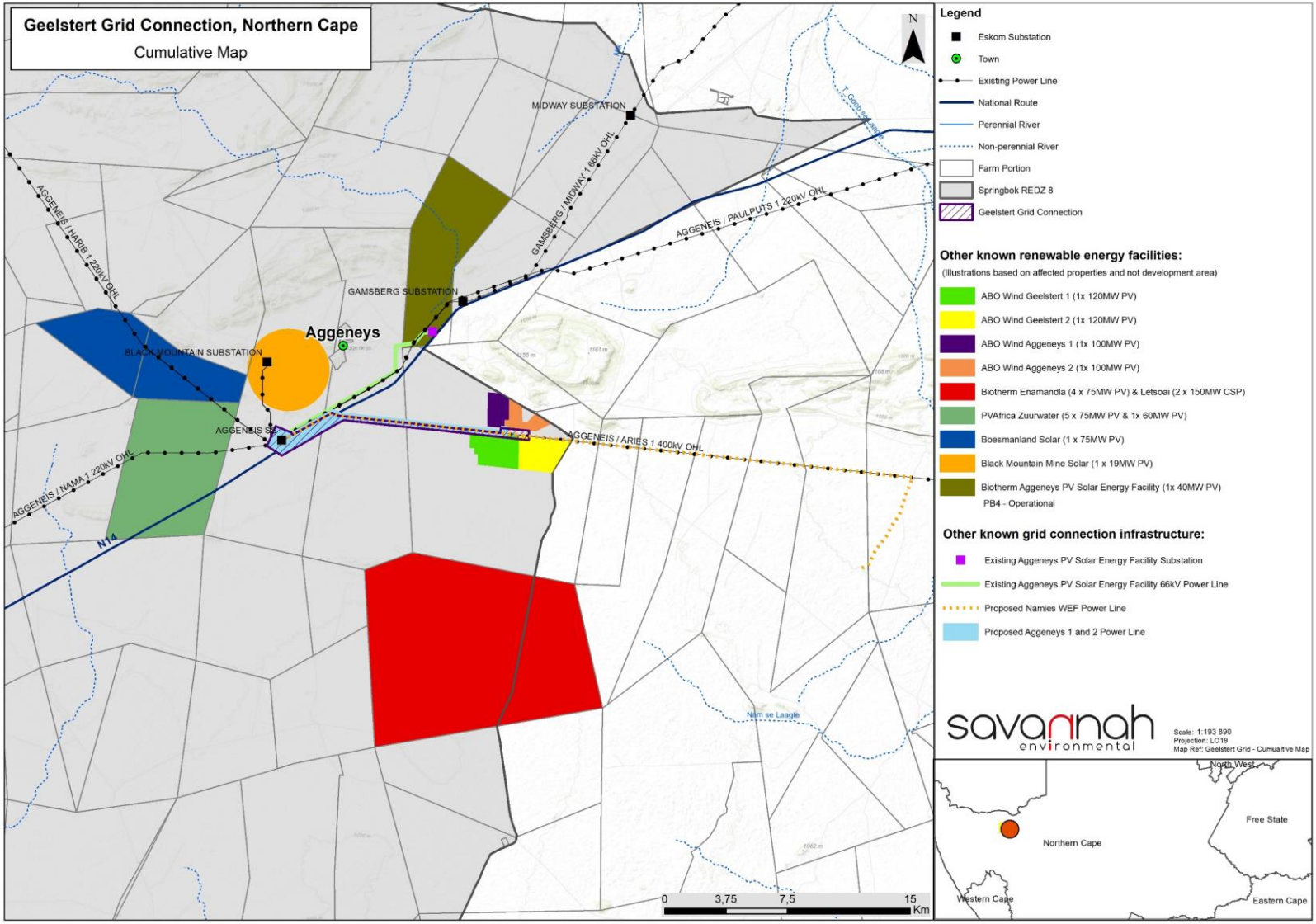

Figure 9.1: Identified renewable energy projects associated with grid connection infrastructure located within the surrounding area of grid connection corridor for the Geelstert Grid Connection

9.3 Cumulative Impacts on Ecological Processes

A reduced ability to meet conservation obligations and targets due to cumulative habitat loss, and an impact on CBAs and broad-scale ecological processes have been identified as the primary ecological impacts from a cumulative perspective (refer to **Appendix D**). Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. Due to the presence of a number of other renewable energy, grid connection infrastructure and mining developments in the area, these are potential cumulative impacts associated with the development of the Geelstert Grid Connection.

The ecological impacts associated with the Geelstert Grid Connection will be of a medium and low significance, depending on the cumulative impact being considered. The contribution of the proposed development to cumulative impacts is however considered to be low.

Nature: *Reduced ability to meet conservation obligations and targets due to cumulative habitat loss*
The development of the Geelstert Grid Connection will contribute to cumulative habitat loss and other cumulative impacts in the wider Aggeneys area which may reduce the ability to meet the conservation obligations and targets.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (3)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Medium (30)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	To some degree, but some residual habitat loss will persist.	

Mitigation:

» Ensure that disturbance and habitat loss along the power line route is kept to a minimum. The access road and pylon footprint areas in the dune habitat should be checked for erosion every 6 months for at least 2 years after construction.

» Ensure that an alien management plan and control are implemented along the power line servitude for the duration of the operational phase. This should be check annually.

Nature: *Negative impact on broad-scale ecological processes*
Development of the Geelstert Grid Connection may impact on CBAs and broad scale ecological processes such as the ability for fauna to disperse.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (3)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate

Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Largely, although there will be some persistent habitat loss and disturbance.	
Mitigation: » Ensure that the mitigation hierarchy is applied with a particular emphasis on reducing the development footprint of the grid connection infrastructure, rehabilitating disturbed areas and minimising degradation around the servitude.		
Residual Risks: Once construction has been completed there would be little residual and persistent impact associated with the power line and collector substation.		

9.4 Cumulative Impacts on Avifauna

Avifauna cumulative impacts are those impacts that will affect the general avian communities in and around the grid connection corridor due to the combined cumulative effect of all the grid infrastructure developments located within the area. These impacts will be due to collisions and electrocutions, avoidance, and the displacement of avian species from their habitats.

There are numerous proposed and approved renewable solar energy developments in the Aggeneys area, concentrated along the N14. The potential for cumulative impacts on grid connection infrastructure in the area is therefore of potential concern given the large number of different proposed renewable energy developments. Furthermore, the area is a REDZ and a Strategic Transmission Corridor. Although, there is only one operational solar PV facility within the vicinity of the grid connection corridor, the majority of the projects are proposed within the vicinity of the town of Aggeneys, therefore in the long-term a node for renewable energy developments and associated grid connection infrastructure is likely to occur. The total estimated direct footprint of the existing approved projects is estimated at as much as 9000ha, should all proposed renewable energy projects in the area be established. The proposed projects are largely concentrated within the plains habitat of the Bushmanland Arid Grassland vegetation type, which is a widespread habitat associated with relatively low avifauna diversity. As the Bushmanland Arid Grassland vegetation type is the most extensive vegetation type in South Africa, the loss of 9 000ha of this vegetation type is not of a high significance from a regional perspective, however, the major impact would be related to impacts on the landscape connectivity within the surrounding landscape.

The location of the grid connection corridor parallel to an existing power line is a mitigating circumstance which would serve to reduce the cumulative impact associated with the development of the Geelstert Grid Connection. This will also reduce the potential for collisions with large raptors and terrestrial birds (e.g. bustards, etc.) since the grid connection infrastructure for the Geelstert Grid Connection will be located parallel to an existing power line. The footprint of the Geelstert Grid Connection within the high sensitivity Bushmanland Sandy Grassland habitat is low and should therefore have minimal negative impacts on the Red Lark or its distribution within the surrounding area. The major ecological corridors within the area, such as the Koa River Palaeovalley, located to the south and the Ghaamsberg inselbergs to the north of the grid connection corridor would not be impacted by the development of the Geelstert Grid Connection. These areas within the landscape are largely still free renewable energy development, therefore the capacity of the area to support developments is considered to be high.

Given the broad-scale over which most of the ecological processes in this area operate, the current levels of habitat fragmentation are still considered to be low and not a threat to ecological processes and avifauna in the area. The contribution of the proposed Geelstert Grid Connection, with a length of

approximately 17.5km is considered relatively low from an avifauna perspective and would result in a low contribution to cumulative impact in the area and is therefore considered to be acceptable.

The cumulative impact of the development of the Geelstert Grid Connection and other proposed grid connection infrastructure developments within the area is associated with a medium significance (**Appendix E**). No cumulative impacts of a high significance from an avifauna perspective were identified.

Nature: *Cumulative impact on the Haramoep and Black Mountain IBA.* Impact on the Haramoep and Black Mountain IBA as well as avifaunal habitats, migration routes and nesting areas due to cumulative loss and fragmentation of habitat, as well collisions and electrocutions along the grid connection corridor. Increased probability of bird collisions and electrocutions with new power lines may contribute to the cumulative impacts of the proposed development. However, considering that the proposed grid connection corridor follows the existing Aries/Aggeneis 400kV Power Line to the Aggeneis MTS, the potential impacts are not considered significantly accumulative.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Moderate (5)
Probability	Improbable (2)	Probable (3)
Significance	**Low (18)**	**Medium (33)**
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated	To some degree, but the majority of the long-term impact results from the presence of the power line and other developments in the area which cannot be well-mitigated.	
Mitigation: » Initiate increased monitoring along the power line servitudes in the area during periods when numbers of large nomadic species (e.g. Ludwig's Bustard) are highest, to determine any areas along the servitudes where there are potentially high collision rates. Such areas should be fitted with bird diverters to reduce collisions rates.		

9.5 Cumulative Impacts on Freshwater Features

The cumulative impacts to freshwater features would be as a result of similar developments within the same catchment which may result in the direct physical alteration and degradation of freshwater features (refer to **Appendix F**). Indirectly, from a catchment level, transformation of land use and associated change in surface roughness resulting in consequent hydrological alterations in the catchment drainage are also of concern. Increased sedimentation and erosion may also occur.

The impacts to freshwater features associated with the Geelstert Grid Connection and other grid connection infrastructure developments within the surrounding area will be of a low significance as the majority of the freshwater features present within the area can be adequately spanned by the grid connection infrastructure. As a result, the development of the Geelstert Grid Connection is considered acceptable from a freshwater perspective.

Nature: *An impact on the ecological processes as well as ecological functioning of important habitats* Transformation of intact habitat could potentially compromise ecological processes as well as ecological functioning of important habitats and would contribute to habitat fragmentation and potentially disruption of habitat connectivity and furthermore impair their ability to respond to environmental fluctuations. This is especially of relevance for larger watercourses and wetlands serving as important groundwater recharge and floodwater attenuation zones, important microhabitats for various organisms and important corridor zones for faunal movement.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Small (1)	Small (1)
Probability	Highly Improbable (1)	Highly Improbable (1)
Significance	**Low (6)**	**Low (6)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » The development footprint of the grid connection infrastructure should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. » Use existing service roads when crossing the freshwater features and avoid the introduction of new roads. » No pylons may be placed within the freshwater features as well as their recommended buffer areas.		

9.6 Cumulative Impacts Soil and Agricultural Potential

Cumulative impacts on soils are related to an increase in the potential for wind erosion of disturbed areas (refer to **Appendix G**). The likelihood of cumulative impacts from wind erosion may be significant, if not mitigated. This is due to the increased disturbance of areas associated with grid connection infrastructure developments in the region.

When considering the other renewable solar energy developments and their associated grid connection infrastructure within the surrounding area, it is assumed that the impact of erosion and appropriate mitigation measures at a site-specific level for each of the facilities (as well as any grid connection infrastructure that may be required) has been considered and the mitigation measures recommended are sufficient for the management and mitigation of erosion. Therefore, considering that the impact of erosion at each facility will be low in extent, subject to the implementation of the recommended mitigation measures, and managed for each facility separately, the cumulative impact for erosion is considered to be low. Under these circumstances, the loss associated with erosion is therefore considered to be acceptable, without detrimental consequences.

If there is a large-scale development of renewable energy facilities and associated grid connection infrastructure in the area, any failure to prevent wind erosion of topsoil on one project could lead to that material being deposited on any or all neighbouring properties.

Nature: *Cumulative impacts of the proposed development in terms of wind erosion.*

The development of additional grid infrastructure projects within the area will lead to soil erosion impacts from a cumulative perspective

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (1)	Low (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (10)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- To minimise the footprint of construction as much as possible.
- Where soil is removed/disturbed, ensure it is stored for rehabilitation and re-vegetated as soon as possible.
- Implement all appropriate soil conservation measures, including contouring, culverts etc. (for road construction), geotextiles and slope stabilisation (for all infrastructure).
- Ensure that equal responsibility and co-operation is accepted if more than one facility will be using the same access road, or if the possibility exists of sediment transfer (by wind or water) from one site to another.

9.7 Cumulative Impacts on Heritage (including archaeology and palaeontology)

The findings of the Heritage Report (refer to **Appendix H** and **Appendix H1**) has shown that it is unlikely that the development of the Geelstert Grid Connection will have a negative impact on archaeological and palaeontological resources from a cumulative perspective, therefore no cumulative impact assessment table has been provided for heritage impacts. However, given the heritage sensitivity of the surrounding area, the following is recommended:

- If concentrations of historical and pre-colonial archaealogical heritage material and/or human remains (including graves and burials) are uncovered during the construction phase, all work in the vicinity must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) so that systematic and professional investiagation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collecitons of the pre-colonial shell middens and associated artefacts will then be conducted to establish the contextual status of thesites and possibly remove the archaeological deposit before development activities continue.
- A person must be trained as a site monitor to report any archaeological sites found during the development. The Construction Manager/Foreman and/or the Environmental Control Officer (ECO) should be informed prior to the commencment of the construction phase of the possible types of heritage sites and cultural material they may encounter and the procedures to follow should heritage sites be found.

9.8 Cumulative Visual Impacts

The cumulative impacts assessed for the proposed development considered the visual impacts of the existing grid connection infrastructure, as well as the mining developments in the area and future proposed renewable energy projects with associated grid connection infrastructure.

Cumulative visual impacts have been identified and assessed for the development of the Geelstert Grid Connection (refer to **Appendix I** and **Appendix I1**). The grid connection corridor for the Geelstert Grid Connection is located parallel to the existing Aries/Aggeneis 400kV Power Line. As a result, the development of the grid connection infrastructure will not extend the visual impacts within the area as it is already impacted by existing grid connection infrastructure. However, it is likely that the Geelstert Grid Connection will intensify the view of the existing power line that it follows in the area. In addition, the Geelstert Grid Connection is likely to add to the visual impacts of the proposed Geelstert 1 and Geelstert 2 solar PV facilities within the area.

The Geelstert Grid Connection will have an impact on the Developed Landscape Character Area (LCA). However, the presence of the mining operations and other grid connection infrastructure has already had a negative impact on the general landscape. The significance of this cumulative impact will be high. The section of the grid connection corridor that is located parallel to the N14 runs through the Developed LCA. Existing grid connection infrastructure is obvious from the N14, from the section of the N14 and the Loop 10 Road. In addition, the section of the grid connection corridor near the Aggeneis MTS is associated with the convergence of multiple existing power lines, which are more obvious from the N14. From a cumulative visual perspective, this impact is associated with a high significance.

Cumulative visual impacts of the proposed development from the Loop 10 Road will be of a medium significance due to views from this road being unaffected by the presence of grid connection infrastructure. View of existing grid connection infrastructure becomes more obvious when a traveller along this road approaches the intersection with the N14. In addition, the existing Aries/Aggeneis 400kV Power Line traverses the road to the east, however this road is largely associated with low traffic volumes, therefore, views of the Geelstert Grid Connection from this road are associated with a low significance.

There are a few homesteads within the surrounding landscape of the grid connection corridor for the Geelstert Grid Connection. One homestead is located to the north-east of the grid connection corridor at a distance of 2.7km, however this homestead appears to be unoccupied. The existing Aries/Aggeneis 400kv Power Line is located in close proximity to the homestead, therefore views from the homestead have already been impacted by this power line. Therefore, due to the proximity of the grid connection infrastructure from this homestead, the cumulative impact is therefore associated with a high significance.

Cumulative visual impacts that are likely to be experienced from the Aggeneys area, will be of a medium significance.

In general, the Geelstert Grid Connection Corridor will impact on an area that is already impacted by mining developments and large-scale grid connection infrastructure. As a result, the cumulative visual impacts of the proposed development will be range from low, medium and high, depending on the impact being assessed. In conclusion, the development of the Geelstert Grid Connection is considered acceptable from a cumulative perspective.

Nature: *General landscape change and degradation of natural/urban landscape characteristics*

The proposed overhead power line and collector substation will mainly impact the Developed LCA. They will have marginal influence on the more natural Rural LCA however, due to the nature of existing industries in the area, existing grid connection infrastructure has already heavily impacted the general area. The proposed development will therefore not extend the cumulative area over which development impacts the landscape. The proposed development will only intensify existing impacts as it follows existing power lines.

The proposed Geelstert Collector Substation also has the potential to increase the extent of electrical infrastructure, however, the area impacted by the collector substation will fall within the ZTV of the grid connection corridor and so will not extend impacts further.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Immediate surroundings (2)	Region (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Moderate to High (7)
Probability	Probable (3)	Definite (5)
Significance	**Low (24)**	**High (70)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes, to a small degree but this will not have a significant impact.	Unknown

Mitigation:

- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- Ensure that vegetation is not unnecessarily removed during the construction phase.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.

Nature: *Cumulative impact of the proposed grid connection infrastructure on views from the N14*

The section of the N14 that will be affected by the development runs through the Developed LCA.

Due to distance, the grid connection corridor will have the most significant influence on views from this receptor. The proposed Geelstert Collector Substation is located 7.6km from the road will have negligible influence.

Grid connection infrastructure is obvious from the section of the N14 and affects the N14 for approximately 8m from the Aggeneis MTS. Character views from this section of the N14 are already heavily influenced by existing power lines and substations, therefore the impact of the Geelstert Grid Connection from this road is assessed as having a low significance.

Between the location that the Aries/Aggeneis 400kV Power Line joins the N14 and the Aggeneis MTS, larger infrastructure gradually converges on the substation and becomes closer to and more obvious from the road. The proposed grid connection corridor will generally affect the section of the road between the Aries/Aggeneis 400kV Power Line and the Aggeneis MTS.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**

Extent	Immediate surroundings (2)	Region (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Moderate to High (7)
Probability	Probable (3)	Definite (5)
Significance	**Low (24)**	**High (70)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes, to a small degree, but this will not have a significant impact.	Unknown

Mitigation:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction phase.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.

Nature: *Cumulative impact on the proposed grid connection infrastructure views from the Loop 10 Road to the north of the authorised Aggeneys 1 and Aggeneys 2 solar PV facilities.*

Views from the Loop Road 10 are currently relatively un-affected by grid connection infrastructure although overhead power lines become more obvious as the traveller approaches the N14. The Aries/Aggeneis 400kV Power Line also crosses the Gamoep Road (R358) located to the east of the proposed Aggeneys 1 and Aggeneys 2 solar PV projects. The proposed grid connection corridor is located with the Developed LCA. The grid connection corridor, including the location of the Geelstert Collector Substation is likely to be visible but will not be obvious from the road. Considering that the road is associated with low traffic impacts, the significance of impact is low for the Geelstert Grid Connection in isolation. The cumulative impact will be of a medium significance.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Immediate surroundings (2)	Immediate surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Medium (30)**
Status (positive or negative)	The intensity of development within the Developed LCA is likely to intensify particularly in areas where development and electrical infrastructure is not as obvious. The affected area is one of the areas that is least affected by development in general and particularly by grid connection infrastructure. The proposed project is unlikely to be obvious from this road and so the impact is likely to have a neutral consequence.	Neutral

Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes, to a small degree, but will not have a significant impact.	Unknown

Mitigation:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction phase.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.

Nature: *Cumulative impact on the proposed grid connection infrastructure on views from the local homestead*

Due to the fact that the local mine owns the majority of land in the area and probably due to the fact that the stock carrying capacity of the land is relatively low, there are very few homesteads in the area. There is only one homestead that could potentially be affected which is approximately 2.7km to the east of the eastern end of the grid connection corridor.

The significance of the direct impact on this homestead associated with both power line and collector substation, taking into account its use, and existing impacts associated with grid connection infrastructure was assessed as low.

The existing Aries/Aggeneis 400kV Power Line crosses in close proximity (within 200m) to the homestead so views from the homestead are impacted by existing large-scale grid connection infrastructure. Due to the relative proximity of existing electrical infrastructure, the significance of the cumulative impact is assessed as high.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Immediate surroundings (2)	Immediate surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Moderate (6)
Probability	Improbable (2)	Definite (5)
Significance	**Low (16)**	**High (60)**
Status (positive or negative)	The intensity of development within the Developed LCA is likely to intensify particularly in areas where development and electrical infrastructure is not as obvious. The affected area is one of the areas that is least affected by development in general and particularly by electrical infrastructure. The development is unlikely to be obvious and so the impact is likely to have a **neutral** consequence.	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes, to a small degree, but this will not have a significant impact.	Unknown

Mitigation:

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- » Ensure that vegetation is not unnecessarily removed during the construction phase.
- » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- » Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.

Nature: *Cumulative impact on settlement areas*

The landscape between Aggeneys and the grid connection corridor is already heavily impacted by grid connection infrastructure.

Due to the density of development and vegetation within the settlement, the power line is only likely to be visible from the southern edge of Aggeneys. At its closest, the grid connection corridor is located approximately 2.6km from the settlement.

The proposed collector substation is located in excess of 10km from the settlement and is highly unlikely to be visible and will not add to cumulative impacts.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Immediate surroundings (2)	Immediate surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Small to Minor (1)	Low to Moderate (5)
Probability	Improbable (2)	Probable (3)
Significance	**Low (14)**	**Medium (33)**
Status (positive or negative)	Development within the Developed LCA is likely to intensify particularly in areas where development and electrical infrastructure is not as obvious. The affected area is one of the areas that is least affected by development in general and particularly by electrical infrastructure. The project is unlikely to be obvious from this road and so the impact is likely to have a neutral consequence.	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes, to a small degree but this will not have a significant impact.	Unknown

Mitigation:

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- » Ensure that vegetation is not unnecessarily removed during the construction phase.
- » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- » Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.

9.9 Cumulative Social Impacts

The potential for social cumulative impacts is likely to occur and includes both positive and negative impacts (refer to **Appendix J**). The significance of the cumulative impacts will range between low and medium, depending on the impact being assessed.

Nature: *An increase in employment opportunities, skills development and business opportunities with the establishment of more than one solar power facility.*

The Geelstert Grid Connection, the establishment of associated grid connection infrastructure for other solar power projects and grid connection infrastructure associated with the national grid within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream/spin-off business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of the Geelstert Grid Connection alone.

The positive impacts are mainly associated with the construction phase and not operation phase.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local- Regional-National (4)	Local- Regional-National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Small (0)	Low (4)
Probability	Probable (3)	Highly Probable (4)
Significance	**Low (24)**	**Medium (48)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	N/A	
Can impacts be mitigated?	Yes (enhanced)	
Confidence in findings	High	

Enhancement:

The establishment of grid connection infrastructure projects within the area has the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development and business opportunities. The positive benefits will be enhanced if local employment policies are adopted and local services providers are utilised by the developers to maximise the project opportunities available to the local community.

Residual impacts:

- Improved pool of skills and experience in the local area.
- Improved standard of living through the creation of employment opportunities.
- Economic growth for small-scale entrepreneurs.

Nature: *Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area.*

While the development of the Geelstert Grid Connection may not result in a major influx of people into the area, the development of several projects at the same time may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within REDZ 8 and within the Northern Strategic Transmission Corridor, which has specifically been earmarked for the development of large scale solar PV energy facilities and grid connection infrastructure, implies that the surrounding area is likely to be subject to considerable amount of future applications and expansion of such infrastructure. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and standards of

living.

It is very difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local-Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Low (4)
Probability	Very Improbable (1)	Improbable (2)
Significance	**Low (8)**	**Low (22)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Confidence in findings	High	

Mitigation:

» Develop a recruitment policy / process (to be implemented by contractors), which will source labour locally.
» Work together with government agencies to ensure that service provision is in line with the development needs of the local area.
» Form joint ventures with community organisations, through Trusts, which can provide local communities with benefits, such as employment opportunities and services.
» Develop and implement a recruitment protocol in consultation with the municipality and local community leaders. Ensure that the procedures for applications for employment are clearly communicated.

Residual impacts

» Possibility of outside workers remaining in the area after the construction is completed and the subsequent potential pressures on local infrastructure, services and poverty problems.

Nature: *Visual impact and impact on the sense of place and landscape character*

The location of the Geelstert Grid Connection, within the Springbok REDZ and the Northern Strategic Transmission Corridor will contribute to the consolidation of infrastructure to this locality and avoid a potentially scattered proliferation of solar energy generation structures and the associated grid connection infrastructure throughout the region. However, the location of the development next to existing grid infrastructure and in an area already subjected to industrial development reduces the impact on the sense of place from a social perspective as the area has been identified and established for the development of large scale solar energy facilities.

The identification of the significance of the cumulative impact on sense of place was undertaken through the consideration of the Visual Impact Assessment (Environmental Planning and Design, 2020) undertaken for the project.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local-Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (20)**	**Medium (33)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	

Irreplaceable loss of resources?	No
Can impacts be mitigated?	No, only best practice measures can be implemented
Confidence in findings	High
Mitigation: » Maintain and manage the facilities to be in a good and neat condition to ensure that no degradation of the area and sites takes place and impacts the visual quality of the area. » Implement the relevant mitigation measures as recommended in the Visual Impact Assessment.	
Residual impacts » The visual impact will remain until the infrastructure is completely decommissioned and removed. Thereafter the impact will be removed.	

9.10 Conclusion regarding Cumulative Impacts

The assessment of the cumulative impacts was undertaken through the consideration of the impacts for the Geelstert Grid Connection in isolation and in comparison, to the cumulative impacts of other renewable energy and associated grid infrastructure developments in the surrounding area. Cumulative impacts are expected to occur with the development of the grid infrastructure throughout all phases of the project life cycle and within all areas of study considered as part of this final BA Report.

The contribution of the project to the significance of the cumulative impacts is predominately low to medium, depending on the impacts being considered, with visual cumulative impacts being high in some instances. A summary of the cumulative impacts is provided in **Table 9.2** below.

Table 9.2: Summary of the cumulative impact significance for the Geelstert Grid Connection[22].

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Ecology	Low	Medium to low (depending on the impact being considered)
Avifauna	Low	Medium
Freshwater	Low	Low
Soil and agricultural potential	Low	Low
Heritage (archaeology and palaeontology)	Low	Low
Visual	Low	Medium to High (depending on the impact being assessed)
Social	Negative social impacts – Low Positive social impacts – Medium	Negative social impacts – Low Positive social impacts – Medium

The main aim for the assessment of cumulative impacts considering the Geelstert Grid Connection is to determine whether the cumulative development will be acceptable within the landscape proposed for

[22] Significance ratings assume that mitigation as recommended is implemented.

the development, and whether the cumulative loss, from an environmental and social perspective, will be acceptable without whole-scale change. The following can be concluded regarding the cumulative impacts of the grid connection infrastructure:

- ***Ecological processes:*** Cumulative impacts on CBAs and broad-scale ecological processes will be of a medium to low significance. There will be no unacceptable loss of threatened or protected vegetation types, habitats or species due to the development of the proposed project and other renewable energy and associated grid infrastructure developments within the surrounding area.
- ***Avifauna:*** Cumulative impacts as a result of loss of habitats from the surrounding area which may impact avifauna will be of a medium significance. There will be no unacceptable risk to avifauna or loss of avifauna habitats or species due to the development of the Geelstert Grid Connection and other proposed grid connection developments within the area.
- ***Freshwater Features:*** Cumulative impacts resulting because of the transformation of the habitat, which will lead to physical alterations in the catchment drainage and increased sedimentation and erosion will be of a low significance. There will be no unacceptable loss of freshwater features or resources due to disturbance associated with construction activities of the Geelstert Grid Connection and other proposed grid infrastructure developments within the surrounding landscape.
- ***Soils and Agricultural Potential:*** Cumulative impacts in terms of soil erosion will be of a low significance. There will be no unacceptable loss of soil resources or increased soil erosion associated with the development of the Geelstert Grid Connection and other proposed grid connection infrastructure developments within the surrounding landscape.
- ***Heritage (including archaeology and palaeontology):*** The significance of the cumulative impact will be low. There will be no unacceptable loss of heritage resources associated with the Geelstert Grid Connection and other proposed grid infrastructure developments within the surrounding landscape.
- ***Visual:*** Cumulative visual impacts relate to change in the character of the landscape as seen from the N14 and the Loop 10 Road, cumulative impact on local homesteads, and the Aggeneys settlements. The significance of the visual cumulative impacts will be low to high, depending on the impact being assessed. There will be no unacceptable impact on the visual quality of the landscape associated with the Geelstert Grid Connection and other grid connection infrastructure developments within the surrounding landscape.
- ***Social:*** Both positive and negative social cumulative impacts have been identified. The positive impacts relate to positive economic impacts and the negative impacts relate to the transformation of a sense of place and an in-migration of people to the area. There will be no unacceptable risk or impacts to the social aspects and characteristics of the town of Aggeneys with the development of the Geelstert Grid Connection and other proposed grid connection infrastructure developments within the surrounding landscape.

Based on the specialist cumulative assessment and findings, the development of the Geelstert Grid Connection and its contribution to the overall impact to all grid connection infrastructure developments to be developed within the area, it can be concluded that the contribution of the project to cumulative impacts will be of a low to medium significance, depending on the impact being considered. There are however no impacts or risks identified to be considered as unacceptable with the development of the Geelstert Grid Connection within the landscape. In addition, no impacts that will result in a whole-scale change of the area are expected.

CHAPTER 10: CONCLUSIONS AND RECOMMENDATIONS

ABO Wind renewable energies (Pty) Ltd, proposes the construction and operation of a grid connection for two proposed solar PV facilities located south-east of Aggeneys in the Northern Cape Province. The project is known as the Geelstert Grid Connection and the proposed infrastructure will include the development of a collector substation, a double-circuit power line (up to 220kV in capacity) and a single-circuit power line (up to 220kV in capacity) to connect the proposed Geelstert 1 and Geelstert 2 solar PV facilities[23] and the authorised Aggeneys 1 and Aggeneys 2 collector substations to the Aggeneis Main Transmission Substation (MTS).

A 17.5km long and 1km wide (extending to 2km at the Aggeneis Main Transmission Substation (MTS)) grid connection corridor has been assessed to allow for the optimisation of the grid connection infrastructure and to accommodate the environmental sensitivities identified within the corridor (refer to **Figure 10.1** and **10.2**).

The development of the Geelstert Grid Connection (as assessed within this final Basic Assessment (BA) Report) is considered to be necessary associated infrastructure required for the operation of the Geelstert 1 and Geelstert 2 solar PV facilities, and is therefore also developed in response to identified objectives of the national and provincial governments, and local and district municipalities to develop renewable energy facilities for power generation purposes. The grid connection corridor is located within the Springbok Renewable Energy Development Zone (REDZ) or REDZ 8, and within the Northern Corridor of the Strategic Transmission Corridors.

The full length of the assessed grid connection corridor traverses the following properties, namely:

- Remaining Extent of the Farm Bloemhoek 61
- Remaining Extent of the Farm Aggeneys 56
- Remaining Extent of Portion 1 of the Farm Aggeneys 56
- Portion 2 of the Farm Aggeneys 56
- Portion 12 of the Farm Aggeneys 56
- Portion 13 of the Farm Aggeneys 56

A summary of the recommendations and conclusions for the proposed project as determined through the BA process is provided in this Chapter.

[23] These projects comprise the development of two 125MW solar PV facilities and are subject to separate Basic Assessment (BA) processes.

10.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the final BA Report includes the following information required in terms of Appendix 1: Content of BA reports:

Requirement	Relevant Section
3(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	A summary of the findings of the specialist studies undertaken for the grid connection corridor has been included in section 10.2.
3(l) an environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	An environmental impact statement containing the key findings of the environmental impacts of the Geelstert Grid Connection has been included as section 10.5. An environmental sensitivity and layout map of the grid connection infrastructure has been included as **Figure 10.1** which overlays the assessed grid connection corridor with the sensitive environmental features present within the corridor. A summary of the positive and negative impacts associated with the development of the grid connection infrastructure has been included in section 10.2.
3(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	All conditions required to be included in the Environmental Authorisation for the grid connection infrastructure have been included in section 10.6.
3(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	A reasoned opinion as to whether the grid connection infrastructure associated with the Geelstert Grid Connection should be authorised has been included in section 10.6.

10.2. Evaluation of the Geelstert Grid Connection

The preceding chapters of this report together with the specialist studies contained within **Appendices D-J** provide a detailed assessment of the potential impacts that may result from the development of the Geelstert Grid Connection. This chapter concludes the environmental assessment of the development of the grid connection infrastructure within the grid connection corridor by providing a summary of the results and conclusions of the assessment. In doing so, it draws on the information gathered as part of the BA process, the knowledge gained by the environmental specialists and the EAP and presents a combined and informed opinion of the environmental impacts associated with the project.

No environmental fatal flaws or impacts of high significance were identified in the detailed specialist studies conducted, and no impacts of unacceptable significance are expected to occur with the implementation of the recommended mitigation measures. These measures include, amongst others, the avoidance of sensitive features as specified by the specialists.

The potential environmental impacts associated with the grid connection infrastructure identified and assessed through the BA process include:

» Impacts on ecology, flora and fauna.

- Impacts on avifauna.
- Impacts on freshwater features.
- Impacts to soils and agricultural potential.
- Impacts on heritage resources, including archaeology and palaeontology.
- Visual impacts on the area as a result of the grid connection infrastructure.
- Social impacts.

10.2.1. Impacts on Ecology (Fauna and Flora)

The Ecological Impact Assessment (**Appendix D**) is based on the findings of three full field assessments undertaken in June 2018, March 2019, and June 2020. The ecological impacts identified to be associated with the development of the Geelstert Grid Connection will be negative and local in extent. The duration of the construction phase will be short-term and operation phase impacts will be long-term for the lifetime of the grid connection infrastructure.

Impacts during the construction, operation, and the decommissioning phases include impacts on vegetation and protected plants; direct faunal impacts; and habitat degradation due to soil erosion due to alien plant invasion. The significance of the construction, operation and decommissioning phase impacts will be low, following the implementation of the recommended mitigation measures by the specialist. No impacts of a high or medium significance were identified following the implementation of the recommended mitigation measures.

From the findings of the Ecological Impact Assessment (refer to **Appendix D**), it can be concluded that the grid connection corridor assessed for the development of the Geelstert Grid Connection is acceptable from an ecological perspective. As a result, there are no specific long-term impacts associated with the grid connection infrastructure that cannot be reduced to an acceptable level through mitigation and avoidance. Furthermore, there are no high residual impacts or fatal flaws associated with the development, and the project can be supported from an ecological perspective. The specialist has therefore indicated that the Geelstert Grid Connection should be authorised, subject to the implementation of the recommended mitigation measures.

10.2.2. Impacts on Avifauna

The Avifauna Impact Assessment (**Appendix E**) is based on the findings of three full field assessments undertaken in June 2018, March 2019, and June 2020. The impacts on avifauna identified and associated with the development of the Geelstert Grid Connection will be negative and local in extent. The duration of the construction and decommissioning phase impacts will be short-term. The duration of the operation phase impacts will be long-term for the lifetime of the grid connection infrastructure.

The impacts identified for the construction, operation and decommissioning phases for the Geelstert Grid Connection include direct impacts to avifauna, and collisions and electrocutions of avifauna species with the grid connection infrastructure. The most significant mitigation measure is the avoidance/spanning of sensitive habitats for raptors as well as the Red Lark. The significance of the construction and operation phase impacts will be low following the implementation of the recommended mitigation measures.

From the findings of the Avifauna Impact Assessment (**Appendix E**), it can be concluded that with the implementation of the recommended mitigation measures, the identified impacts from an avifauna

perspective associated with the Geelstert Grid Connection can be reduced to acceptable levels. No long-term impacts of a high significance are expected, and no fatal flaws were identified from an avifauna perspective. As a result, the specialist has indicated that the development of the Geelstert Grid Connection is supported and can be authorised, subject to the implementation of the recommended mitigation measures.

10.2.3. Impacts on Freshwater Features

The findings of the Freshwater Resource Study and Assessment (**Appendix F**) is based a field-survey undertaken in July 2020. The identified impacts of the Geelstert Grid Connection on freshwater features present within the grid connection corridor will be negative and local in extent. The duration of the construction (including decommissioning) will be short-term. The impacts for the operation phase will be long-term for the lifetime of the grid connection infrastructure.

The impacts identified from a freshwater perspective for the construction, operation and decommissioning phases for the Geelstert Grid Connection include loss and disturbance of habitats and fauna, impacts on localised surface water quality and an increased risk of sedimentation and erosion extending throughout the operation phase of the grid connection infrastructure. The most significant mitigation measure is the avoidance of sensitive habitats and freshwater features, including ephemeral streams and depression wetlands. The significance of the construction (including decommissioning) and operation phase impacts will be low, following the implementation of the recommended mitigation measures.

From the findings of the Freshwater Resource Study and Assessment (**Appendix F**), it can be concluded that with the implementation of mitigation measures, the identified impacts from a freshwater perspective can be reduced to acceptable levels. No long-term impacts of a high significance are expected to occur, and no fatal flaws were identified from a freshwater perspective. As a result, the specialist has indicated that the development of the Geelstert Grid Connection is supported and can be authorised, subject to the implementation of the recommended mitigation measures.

10.2.4. Impacts on Soil and Agricultural Potential

The Soils and Agricultural Potential Impact Assessment (**Appendix G**) is based on the findings of a field assessment undertaken in November 2018. The impacts to soil identified to be associated with the Geelstert Grid Connection will be negative and local in extent. The duration of the impacts will be short-term for the construction (including decommissioning) phase. The operation phase impacts will have a long-term duration for the lifetime of the grid connection infrastructure.

The impacts identified from a soils and agricultural potential perspective for the construction (including decommissioning) and operation phases for the Geelstert Grid Connection include loss of agricultural land and soil erosion. The significance of the construction (including decommissioning) and operation phase impacts will be low subject to the implementation of the recommended mitigation measures.

From the findings of the Soils and Agricultural Potential (**Appendix G**), it can be concluded that with the implementation of the recommended mitigation measures, the identified impacts from a soils and agricultural potential perspective can be reduced to acceptable levels. No long-term impacts of a high significance are expected to occur, and no fatal flaws were identified from a soils and agricultural

potential perspective. As a result, the specialist has indicated that the development of the Geelstert Grid Connection can be authorised from a soils and agricultural potential perspective.

10.2.5 Impacts on Heritage Resources (including archaeology and palaeontology)

The Heritage Report (**Appendix H** and **Appendix H1**) indicated that the impacts anticipated as a result of the Geelstert Grid Connection will be neutral and local in extent. The duration of the impacts will be short-term for the construction (including decommissioning) phase. No operation phase impacts were assessed for the Geelstert Grid Connection from a heritage perspective.

Heritage impacts during the construction phase of the Geelstert Grid Connection include an impact on the significant archaeological, built environment resources, however this impact is unlikely to occur owing to the lack of significant heritage sites located within the grid connection corridor. Heritage sites are, however, present within the surrounding landscape of the grid connection corridor. In addition, the bedrock associated with the Aggeneys area and the grid connection corridor is mainly unfossilferous and is of no palaeontological interest. As a result, the impact of the Geelstert Grid Connection on heritage and palaeontological resources is of low significance. Therefore, there are no fatal flaws associated with the development of the grid connection infrastructure from a heritage perspective. In conclusion, the specialist has indicated that the development of the Geelstert Grid Connection is supported from a heritage perspective, subject to the implementation of the recommended mitigation measures.

10.2.6. Visual Impacts

The Visual Impact Assessment (**Appendix I** and **Appendix I1**) is based on the findings of a field assessment undertaken in January 2019. The duration of the construction phase impacts will be short-term and local in extent. The operation phase impacts will be local in extent, with a long-term duration for the lifetime of the grid connection infrastructure.

The Visual Impact Assessment identified negative impacts on visual receptors for the construction and the operation phases of the Geelstert Grid Connection. The impacts include a change in the character of the general landscape in the Aggeneys area; a change in the character of the landscape as seen from the N14, the Loop 10 and Gamoep roads; the local homestead located to the north-east of the grid connection corridor; and the residents of Aggeneys. The significance of the impacts will be low with the implementation of the recommended mitigation measures. No impacts of a high or medium significance and fatal flaws are expected to occur following the implementation of the recommended mitigation measures.

From the findings of the Visual Impact Assessment, it is concluded that the development of the Geelstert Grid Connection will largely impact visually on an area where there is currently a strong visual influence of existing grid connection infrastructure (i.e. power lines and substations, etc.) and mining developments (i.e. Gamsberg and Black Mountain Mine), and therefore changes to the landscape as a result of the Geelstert Grid Connection are unlikely to be visually intrusive. As a result, no fatal flaws are anticipated from a visual perspective. In conclusion, the specialist has indicated that the development of the Geelstert Grid Connection is considered acceptable from a visual perspective and can be authorised.

10.2.7 Social Impacts

The Social Impact Assessment (**Appendix J**) identified that most social impacts associated with the development of the Geelstert Grid Connection will have a short-term duration associated with the construction phase (including decommissioning) and long-term duration during the operation phase of the project. Both positive and negative impacts have been identified for both the construction and operation phases of the grid connection infrastructure.

During the construction phase, negative impacts include an influx of jobseekers and a change in the population of the area; safety and security impacts; impacts on daily living and movement patterns; and nuisance impacts, which include noise and dust. The significance of the negative construction phase impacts will be low, within the implementation of the recommended mitigation measures by the specialist. The positive social impacts of the construction phase includes the creation of direct and indirect employment opportunities. The significance of the positive impacts will be medium following the implementation of the recommended enhancement measures.

Social impacts associated with the operation of the Geelstert Grid Connection will be both positive and negative. The negative impacts are related to an influx of jobseekers and a change in the population within the Aggeneys area; and to the transformation in the sense of place of the surrounding landscape. The negative impacts will be of a low significance with the implementation of the recommended mitigation measures. The positive impacts for the operation phase of the grid connection infrastructure will include the creation of employment opportunities and skills development opportunities for the local economy and country. The significance of the positive social impacts during the operation phase will be low, with the implementation of the recommended enhancement measures.

From a social perspective, it is concluded that the development of the Geelstert Grid Connection is acceptable subject to the implementation of the recommended mitigation measures. There are no fatal flaws associated with the development of the grid connection infrastructure and the specialist has indicated that the development of the Geelstert Grid Connection can be supported from a social perspective.

10.2.8 Assessment of Cumulative Impacts

The cumulative impacts of the Geelstert Grid Connection and other known grid connection infrastructure and renewable energy projects in the surrounding area have been qualitatively assessed. There is currently one operational solar PV facility located in the vicinity of the grid connection corridor and seven others proposed. In terms of grid connection infrastructure, there are currently six existing power lines and three substations (including the Aggeneis MTS) within the vicinity of the grid connection corridor.

The assessed grid connection corridor is located within a Strategic Transmission Corridor (i.e. the Northern Transmission Corridor, as well as a Renewable Energy Development Zone (REDZ) (i.e. the Springbok REDZ). These areas form part of the areas identified by the DEFF as geographical areas of strategic importance for the development of commercial renewable energy developments (REDZ) and large-scale grid infrastructure development projects (power transmission corridors). Therefore, the area is considered to be a node for the development of renewable energy and grid infrastructure.

Table 10.1 provides a summary of the findings of the cumulative impact assessment undertaken by the various specialists.

Table 10.1: Summary of the cumulative impact significance of the grid connection infrastructure within the assessed grid connection corridor

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Ecology	Low	Medium to low (depending on the impact being considered)
Avifauna	Low	Medium
Freshwater	Low	Low
Soil and agricultural potential	Low	Low
Heritage (archaeology and palaeontology)	Low	Low
Visual	Low	Medium to High (depending on the impact being assessed)
Social	Negative social impacts – Low Positive social impacts – Medium	Negative social impacts – Low Positive social impacts – Medium

Based on the specialist cumulative assessment and findings, the development of the Geelstert Grid Connection and its contribution to the overall impact of existing grid connection infrastructure within the vicinity is assessed to be low and medium, depending on the impact being considered. In addition, there are high cumulative impacts which are related to views of the grid connection infrastructure from the N14 and views of the grid connection infrastructure from the local homestead located to the north-east of the grid connection infrastructure. Views of the grid connection infrastructure from these areas will be in the context of existing grid connection infrastructure that is present in the area. There are no identified impacts considered as presenting an unacceptable risk from a cumulative perspective. In addition, no impacts that will result in whole-scale change are expected from the development of the Geelstert Grid Connection.

10.3. Environmental Sensitivity of the assessed Grid Connection Corridor

A 17.5km long and 1km wide (extending to 2km at the Aggeneis Main Transmission Substation (MTS)) grid connection corridor is being assessed to allow for the optimisation of the grid connection infrastructure and to accommodate the environmental sensitivities identified within the corridor. From the specialist studies undertaken for the grid connection infrastructure, sensitive areas/environmental features have been identified and demarcated within the grid connection corridor (**Figure 10.1**). The very high and high sensitivity features are required to be considered and avoided by the final placement of the grid connection infrastructure within the assessed grid connection corridor[24]. The points below describe the sensitivity of the features as identified and mapped in **Figure 10.1.**

[24] The grid connection infrastructure will span the very high and high freshwater features located within the grid connection corridor.

The environmental features identified within the grid connection corridor include (refer to **Figure 10.1)**:

» The development area of the Geelstert Collector Substation is located within the plains habitat and is associated with a low ecological and avifauna sensitivity. No freshwater features are present within the vicinity of the collector substation development footprint.

» The section of the grid connection corridor to the west of the development footprint of the collector substation is associated with the presence of depression wetlands, ephemeral watercourses and the dune habitat which supports the presence of the Red Lark avifauna species. The ephemeral watercourses are associated with the presence of woody vegetation component (which includes listed and protected plant species such as the *Boscia foetida subsp. foetida* tree species), and have a high freshwater, ecological and avifauna sensitivity. A buffer of 32m must be applied to these features, and the placement of pylons/towers within the freshwater features and the respective buffer areas is not permitted.

  The depression wetland is associated with the presence of the woody riparian habitat (that comprises the *Boscia foetida subsp. foetida*). This is therefore associated with a high freshwater sensitivity, and a buffer of 15m must be applied. The placement of pylons/towers within this area is not permitted, however existing access roads within the area can be used to gain access to the grid connection corridor.

» The greater part of the central section of the grid connection corridor that routes towards the N14 is associated with the dune habitat of the Red Lark and the widespread plains habitat which characterises the vegetation of the surrounding landscape. The section of the dune habitat traversed by the grid connection corridor marks the northern margin/boundary of the Koa River Palaeovalley. The dune habitat is associated with a high avifauna and medium ecological sensitivity, while the plains habitat is associated with a medium avifauna sensitivity.

» A large ephemeral watercourse traverses the grid connection corridor at the junction of the grid connection corridor with the N14. The terminating sections of the watercourse are made up of a series of smaller drainage lines that terminate into the surrounding landscape. The larger ephemeral watercourse is associated with a high freshwater sensitivity and the smaller drainage lines (including the 32m buffer) are associated with a medium sensitivity. The placement of pylons/towers within the larger ephemeral watercourse and the associated buffer of 32m is not permitted.

» The section of the grid connection corridor along the N14 towards the Aggeneis MTS is associated with the presence of a large ephemeral watercourse. The watercourse is considered to be of a high freshwater, avifauna and ecological sensitivity. The riparian habitat of the watercourse is associated with the presence of protected *Boscia foetida subsp. foetida* tree species and the placement of the pylons/towers within the watercourse and the associated buffer of 32m is not permitted. The habitat within this section of the grid connection corridor largely comprises of the plains habitat, which is associated with a medium avifauna sensitivity. A smaller section of this area, surrounding the footprint of the Aggeneis MTS is made up of the dune habitat and is associated with a high avifauna sensitivity. The dune habitat in this area is traversed by the ephemeral watercourse associated with the *Boscia foetida subsp. foetida* in a north / south direction.

» No heritage sites of significance are located within the gird connection corridor.

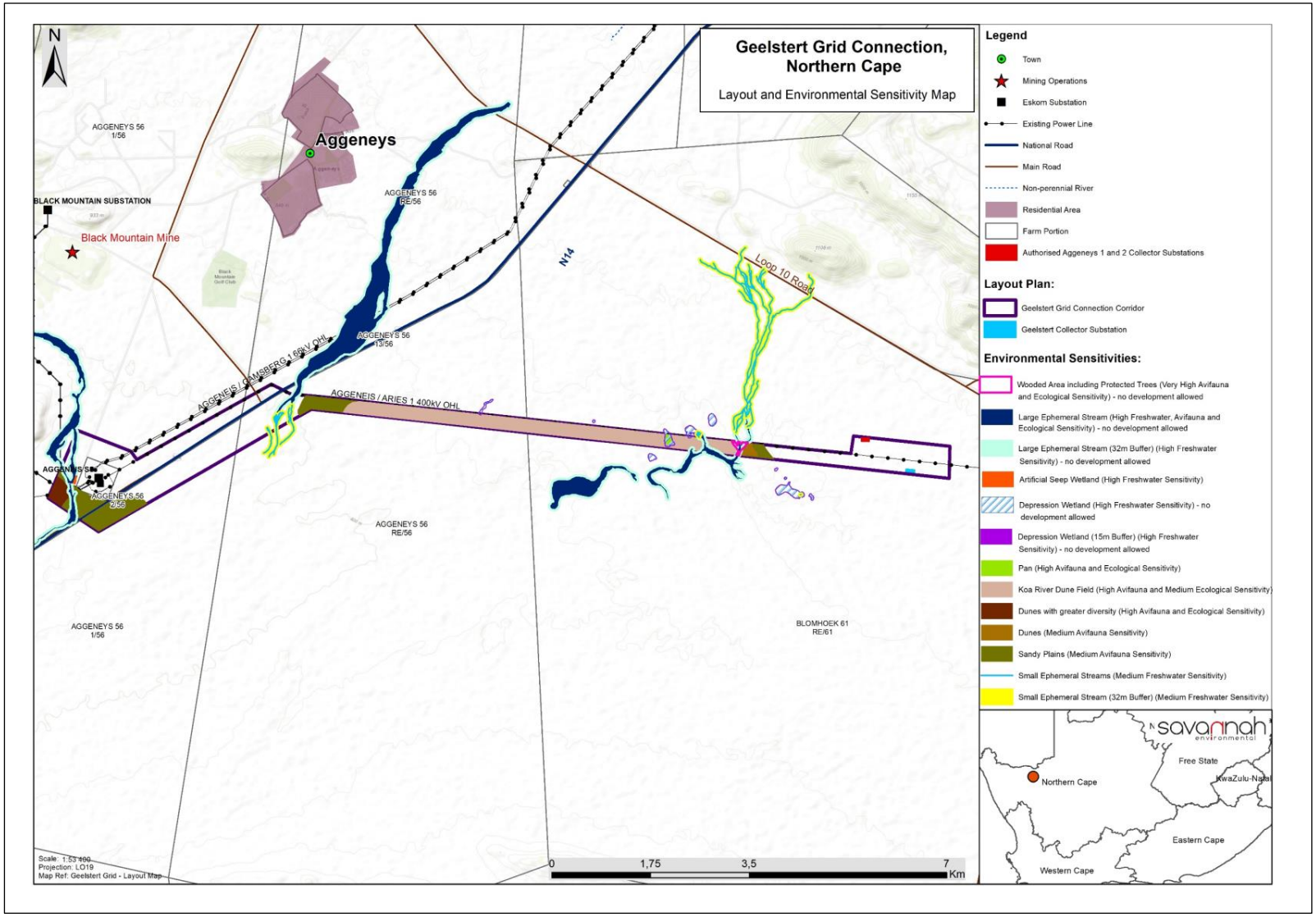

Figure 10.2: Environmental sensitivity map overlain with the assessed Geelstert Grid Connection corridor (**Appendix N**)

10.4. Environmental Costs of the grid connection infrastructure versus Benefits of the grid connection infrastructure

No fatal flaws have been identified to be associated with the proposed project. Environmental costs (including those to the natural, economic and social environment) can, however, be anticipated at a local and site-specific level, and are considered acceptable provided the mitigation measures as outlined in the final BA Report and the EMPr are implemented and adhered to. These environmental costs could include:

- ***A loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for grid connection infrastructure*** - The cost of loss of biodiversity is considered to be limited due to the nature of the footprint of the development which allows for the placement of infrastructure within low sensitivity vegetation where possible.
- ***Visual impacts associated with the grid connection*** - The development of the grid connection infrastructure may have a visual impact within a 7km radius of the grid connection corridor, which will be of a low significance with the implementation of the recommended mitigation measures. As the development of the grid connection infrastructure will largely impact visually on an area already impacted by the presence of existing grid connection infrastructure (i.e. power lines and substations, etc.) and mining developments (i.e. Gamsberg and Black Mountain Mine), changes to the landscape quality as a result of the Geelstert Grid Connection are unlikely to be visually intrusive.
- ***Change in land-use and loss of land available for agricultural activities within the grid connection corridor*** - The environmental cost is anticipated to be limited as the grid connection corridor does not impact on any areas of high agricultural potential, and any grazing activities can continue undisturbed within the power line servitude during the operation phase.

Benefits of the grid connection infrastructure include the following:

- The project will facilitate the connection of the Geelstert 1 and Geelstert 2 solar PV facilities into the national grid. South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. The Geelstert 1 and Geelstert 2 solar PV facilities will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa. Without the grid connection infrastructure, this will not be possible.
- The project will result in important economic benefits at a local and national scale through an increase in production and GDP-R and employment. These will persist during the construction, operation, and decommissioning phases of the project.
- The project indirectly contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.

The benefits of the grid connection infrastructure for the Geelstert Grid Connection are expected at a national, regional and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of the grid connection corridor within areas considered to be acceptable for the development of the grid connection infrastructure, the benefits of the project are expected to outweigh the environmental costs of the grid connection infrastructure.

10.5. Overall Conclusion (Impact Statement)

The construction and operation of the Geelstert Grid Connection has been proposed by ABO Wind renewable energies (Pty) Ltd near Aggeneys in the Northern Cape. A technically viable grid connection corridor within which the infrastructure could be developed was proposed by the proponent and assessed as part of the BA process. The assessment of the environmental suitability of the grid connection corridor for the development of the proposed grid connection infrastructure was undertaken by independent specialists and their findings have informed the results of this final BA Report.

The specialist findings have indicated that there are no identified environmental fatal flaws or impacts of a high significance (following the implementation of mitigation) associated with the implementation of the grid connection infrastructure. The assessed grid connection corridor is therefore the technically preferred option (refer to **Figure 10.2**), which is a direct connection of the Geelstert Collector Substation to the existing Aggeneis MTS, and a connection between the Aggeneys Collector Substations and the Geelstert Substation. All impacts associated with the project establishment within the grid connection corridor can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. The preferred layout map (including the details of the project) is included as **Figure 10.2.**

Through the assessment of the development of the Geelstert Grid Connection within the grid connection corridor, it can be concluded that the proposed project is environmentally acceptable (subject to the implementation of the recommended mitigation measures) with no unacceptable impact significance of whole-scale change.

10.6. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the grid connection corridor proposed by the proponent, the avoidance of sensitive environmental features within the grid connection corridor, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the Environmental Assessment Practitioner (EAP) that the development of the Geelstert Grid Connection is acceptable within the landscape and can reasonably be authorised to be developed within the assessed grid connection corridor (**Figure 10.3**).

The following infrastructure would be included within an authorisation issued for the project:

- A new Geelstert Collector Substation/Switching Station with a development footprint of up to 1.25ha in extent, including:
  - Construction of a new platform with an earth mat and civil works.
  - New feeder bay/s and busbar/s (up to 220kV) complete with protection equipment.
- A double-circuit power line of up to 220kV between the Geelstert Collector Substation and the existing Aggeneis MTS, complete with structures, foundations, conductor, fibre layout, insulation, and assemblies.
- A 6m wide access road to access the Geelstert Collector Substation and 4m wide jeep tracks to provide access to and along the power line servitude.

- A single-circuit power line (of up to 220kV) to connect the authorised Aggeneys 1 and Aggeneys 2 Collector Substations to the proposed Geelstert Collector Substation, including a 6m wide access road along this power line.
- Works within the Aggeneis MTS HV yard:
    - Establishment of new feeder bay/s (up to 220kV), inclusive of line bays, busbars, bussection and protection equipment.
    - Installation of a new transformer (up to 500MVA 400/132kV).

The following key conditions would be required to be included within an authorisation issued for the grid connection infrastructure:

- The grid connection infrastructure for the Geelstert Grid Connection must be developed and optimised within the assessed grid connection corridor and must be placed within areas of low sensitivity and span features of very high and high environmental sensitivity (including the associated buffers applied).
- All mitigation measures detailed within this BA Report, as well as the specialist reports contained within **Appendices D to J**, are to be implemented.
- The EMPrs[25] as contained within **Appendix L** of this BA Report should form part of the contract with the Contractors appointed to construct and maintain the grid connection infrastructure in order to ensure compliance with environmental specifications and management measures. The implementation of the EMPrs for all life cycle phases of the infrastructure is considered key in achieving the appropriate environmental management standards as detailed for this project.
- Following the final design of the grid connection infrastructure, a final layout must be submitted to DEFF for review and approval prior to commencing with construction.
- Before construction commences individuals of listed species within the development footprint that would be affected by the infrastructure and associated servitude must be counted and marked and translocated, where deemed necessary, by the ecologist/botanist conducting the pre-construction walk-through survey. Permits from the relevant provincial authorities, i.e. the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform must be obtained before the individuals are disturbed.
- The necessary water authorisation must be obtained from the Department of Human Settlements, Water and Sanitation prior to the commencement of the construction phase for the project.
- A Chance Find Procedure/Protocol must be developed and implemented in the event that archaeological or palaeontological resources are found during the construction and operation of the grid connection infrastructure. In the case where the proposed development activities bring these materials to the surface, work must cease and the South African Heritage Resources Agency (SAHRA) must be contacted immediately.
- The period for which the Environmental Authorisation is required is 10 years.

[25] Two generic EMPrs have been compiled for the Geelstert Grid Connection in accordance with the requirements of GN R435 of March 2019.

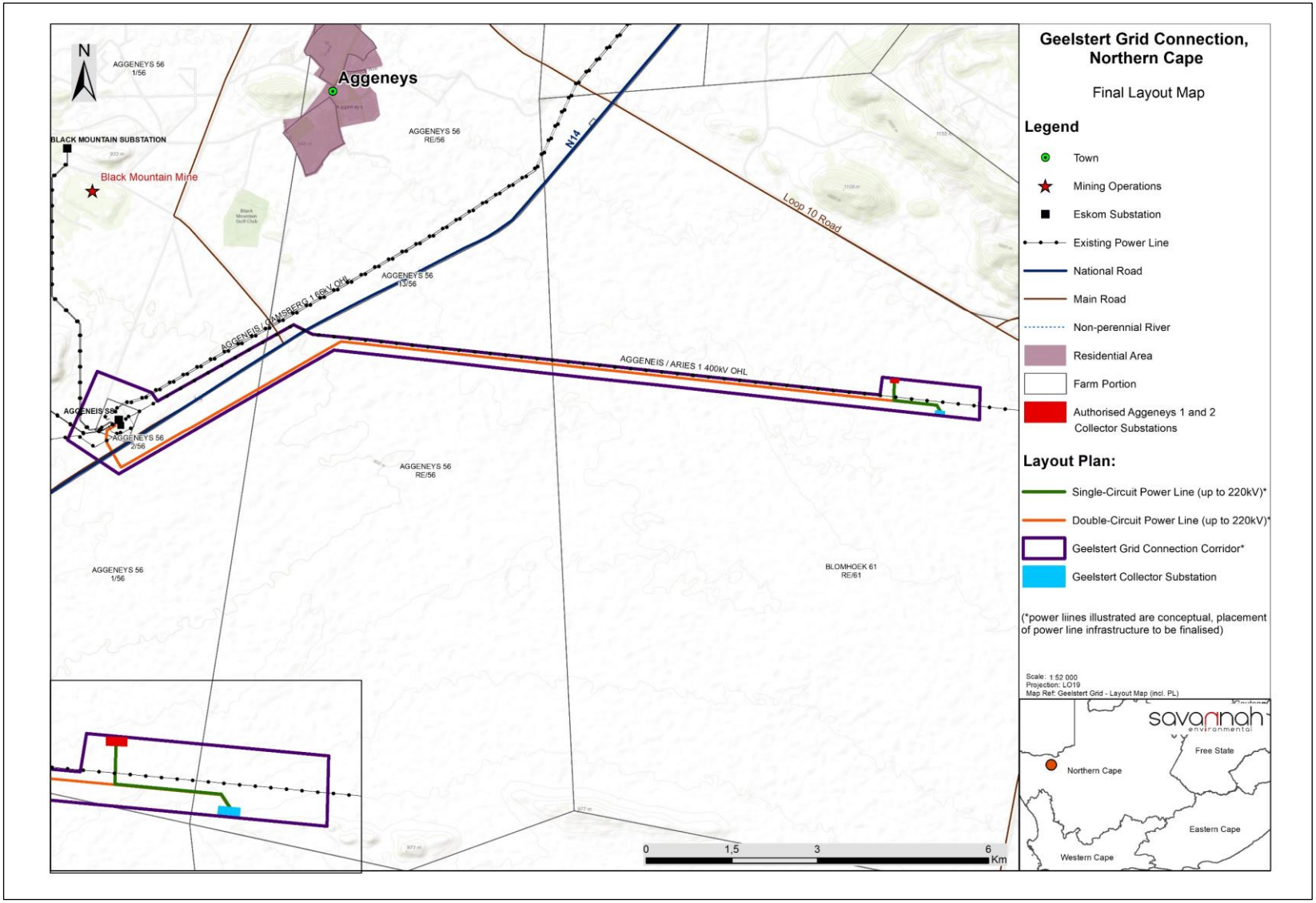

Figure 10.2: Preferred layout map for the grid connection infrastructure for the Geelstert Grid Connection, as was assessed as part of the BA process (A3 map included in **Appendix N**)

CHAPTER 11: REFERENCES

Ecological Impact Assessment

Alexander, G. & Marais, J. 2007. A Guide to the Reptiles of Southern Africa. Struik Nature, Cape Town.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & de Villiers, M. S. 2014. Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Strelitzia 32. SANBI, Pretoria.

Branch W.R. 1998. Field guide to snakes and other reptiles of southern Africa. Struik, Cape Town.

Du Preez, L. & Carruthers, V. 2009. A Complete Guide to the Frogs of Southern Africa. Struik Nature., Cape Town.

EWT & SANBI, 2016. Red List of Mammals of South Africa, Lesotho and Swaziland. EWT, Johannesburg.

Marais, J. 2004. Complete Guide to the Snakes of Southern Africa. Struik Nature, Cape Town.

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.

Mucina L. & Rutherford M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Oosthuysen, E. & Holness, S. 2016. Northern Cape Critical Biodiversity Areas (CBA) Map. Northern Cape Department of Environment and Nature Conservation & Nelson Mandela Metropolitan University. Available at SANBI BGIS http://bgis.sanbi.org/.

Skinner, J.D. & Chimimba, C.T. 2005. The mammals of the Southern African Subregion. Cambridge University Press, Cambridge.

Avifauna Impact Assessment

BirdLife International. 2018. State of the world's birds: taking the pulse of the planet.

BirdLife International, Cambridge.

BirdLife South Africa. 2018. Checklist of birds in South Africa. BirdLife South Africa, Johannesburg.

DeVault, T.L., Seamans, T.W., Schmidt, J.A., Belant, J.L., & Blackwell, B.F. 2014. Bird use of solar photovoltaic installations at US airports: Implications for aviation safety. Landscape and Urban Planning 122: 122–128.

Harrison, J.A., Allan, D.G., Underhill, L.G., Herremans, M., Tree, A.J., Parker, V. & Brown, C.J. (eds). 1997. The atlas of southern African birds. Vol. 1 & 2. BirdLife South Africa, Johannesburg.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (eds). 2005. Roberts Birds of Southern Africa, 7th edition. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

Jenkins, A.R., Ralston-Paton, S. & Smit-Robinson, H.A. 2017. Birds and solar energy. Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. Birdlife South Africa, Johannesburg.

Jenkins, A.R., Shaw, J.M., Smallie, J.J., Gibbons, B., Visagie, R. & Ryan, P.G. 2011. Estimating the impacts of power line collisions on Ludwig's Bustards Neotis ludwigii. Bird Conservation International 21: 303–310.

Jenkins, A.R., Smallie, J.J. & Diamond, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International 20: 263-278.

Kagan, R.A., Verner, T.C., Trail, P.W. & Espinoza, E.O. 2014. Avian mortality at solar energy facilities in southern California: a preliminary analysis. Unpublished report National Fish & Wildlife Forensics Laboratory, USA.

Lehman, R.N., Kennedy, P.L. & Savidge, J.A. 2007. The state of the art in raptor electrocution research: A global review. Biological Conservation 136: 159-174.

Lovich, J.E. and J.R. Ennen. 2011. Wildlife conservation and solar energy development in the desert southwest, United States. BioScience 61: 982-992.

Marnewick, M.D., Retief, E.F., Theron, N.T., Wright, D.R. & Anderson, T.A. 2015. Important Bird and Biodiversity Areas of South Africa. Birdlife South Africa, Johannesburg.

Martin, G.R. & Shaw, J.M. 2010. Bird collisions with power lines: Failing to see the way ahead? Biological Conservation 143: 2695-2702.

Moore-O'Leary, K.A., Hernandez, R.R., Johnston, D.S., Abella, S.R., Tanner, K.E., Swanson, A.C., Kreitler, J., Lovich, J.E. 2017. Sustainability of utility-scale solar energy - critical ecological concepts. Frontiers in Ecology and the Environment 15: 385-394.

Mucina L. & Rutherford M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Rudman, J., Gauché, P., Esler, K.J. 2017. Direct environmental impacts of solar power in two arid biomes: An initial investigation. South African Journal of Science 113(11/12), Art. #2017-0113, 13 pages. http://dx.doi.org/10.17159/sajs.2017/20170113

Shaw, J.M. 2013. Power line collisions in the Karoo: conserving Ludwig's Bustard. Unpublished PhD thesis, University of Cape Town, Cape Town.

Smith, J.A., & Dwyer, J.F. 2016. Avian interactions with renewable energy infrastructure: an update. Condor 118: 411-423.

Southern African Bird Atlas Project 2 (SABAP2). http://sabap2.adu.org.za Accessed October 2018.

Taylor, M.R., Peacock, F. & Wanless, R.W. (eds) 2015. The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Birdlife South Africa, Johannesburg.

Taylor, P.B., Navarro, R.A., Wren-Sargent, M., Harrison, J.A. & Kieswetter, S.L. (eds) 1999. TOTAL CWAC Report: Coordinated Waterbird Counts in South Africa, 1992-1997. Avian Demography Unit, University of Cape Town, Cape Town.

Visser, E. 2016. The impact of South Africa's largest photovoltaic solar energy facility on birds in the Northern Cape, South Africa. Unpublished MSc thesis, University of Cape Town, Cape Town.

Visser, E., Perold, V., Ralston-Paton, S., Cardenal, A.C., & Ryan, P.G. 2018. Assessing the impacts of a utility-scale photovoltaic solar energy facility on birds in the Northern Cape, South Africa. Renewable Energy 133: 1285-1294.

Walston, L.J, Rollins, K.E, LaGory, K.E., Smith, K.P. & Meyers, S.A. 2016. A preliminary assessment of avian mortality at utility-scale solar energy facilities in the United States. Renewable Energy 92: 405-414.

Young, D.J., Harrison, J.A., Navarro, R.A., Anderson, M.A. & Colahan, B.D. 2003. Big birds on farms: Mazda CAR report 1993-2001. Avian Demography Unit, Cape Town.

Aquatic Impact Assessment

Agenda 21 – Action plan for sustainable development of the Department of Environmental Affairs and Tourism (DEAT) 1998.

Agricultural Resources Act, 1983 (Act No. 43 of 1983).

Berliner D. and Desmet P. 2007. Eastern Cape Biodiversity Conservation Plan: Technical Report. Department of Water Affairs and Forestry Project No 2005-012, Pretoria. 1 August 2007.

Department of Water Affairs and Forestry - DWAF (2005). A practical field procedure for identification and delineation of wetland and riparian areas Edition 1. Department of Water Affairs and Forestry, Pretoria. Updated with amendments in 2007.

Germishuizen, G. and Meyer, N.L. (eds) (2003). Plants of southern Africa: an annotated checklist. Strelitzia 14, South African National Biodiversity Institute, Pretoria.

Holness, S & Oosthuysen, E. 2016. Northern Cape Critical Biodiversity Area map, SANBI BGIS.
Kleynhans C.J., Thirion C. and Moolman J. (2005). A Level 1 Ecoregion Classification System for South Africa, Lesotho and Swaziland. Report No. N/0000/00/REQ0104. Resource Quality Services, Department of Water Affairs and Forestry, Pretoria.

Macfarlane, D.M. & Bredin, I.P. 2017. Buffer Zone Guidelines for Rivers, Wetlands and Estuaries Buffer Zone Guidelines for Rivers, Wetlands and Estuaries. WRC Report No TT 715/1/17 Water Research Commission, Pretoria.

Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), as amended.

National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

National Water Act, 1998 (Act No. 36 of 1998), as amended

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Pool-Stanvliet, R., Duffell-Canham, A., Pence, G. & Smart, R. 2017. The Western Cape Biodiversity Spatial Plan Handbook. Stellenbosch: CapeNature.

Soils and Agricultural Potential Impact Assessment

Crop Estimates Consortium, 2019. Field crop boundary data layer (NC province), 2019. Pretoria. Department of Agriculture, Forestry and Fisheries.

Department of Agriculture, Forestry and Fisheries, 2017. National land capability evaluation raster data: Land capability data layer, 2017. Pretoria.

Land Type Survey Staff (1972 – 2006). Land Types of South Africa data set. ARC – Institute for Soil, Climate and Water. Pretoria.

South Africa (Republic) 2018. Long-term grazing capacity for South Africa: Data layer. Government Gazette Vol. 638, No. 41870. 31 August 2018. Regulation 10 of the Conservation of Agricultural Resources Act (CARA): Act 43 of 1983. Pretoria. Government Printing Works.

The Soil Classification Working Group (2018). Soil Classification – Taxonomic System for South Africa. Dept. of Agric., Pretoria.

Heritage Report

Beaumont, P.B., 2004. Kathu Pan and Kathu Townlands/Uitkoms. In: Beaumont, P.B., Morris, D. (Eds.), Archaeology in the Northern Cape: Some Key Sites. McGregor Museum, Kimberley, pp. 50-52.

Cornell, D.H., Thomas, R.J., Moen, H.F.G., Reid, D.L., Moore, J.M., Gibson, R.L., 2006. The Namaqua-Natal Province. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 325-379.

De Wit, M.C.J., Bamford, M.K. 1993. Fossil wood from the Brandvlei area, Bushmanland, as an indication of palaeoenvironmental changes during the Cainozoic. Palaeontologia africana 30, 81-89.

De Wit, M.C.J., Marshall, T.R., Partridge, T.C., 2000. Fluvial depoists and drainage evolution. In: Partridge, T.C., & Maud, R.R. (Eds), The Cainozoic of Southern Africa. Oxford University Press, New York, 55-72.

De Wit, M.C.J. Ward, J.D., Bamford, M.K., Roberts, M., 2009. The significance of the Cretaceous Diamondiferous gravel deposit at Mahura Muthla in the Vryburg District of the Northern Cape Province in South Africa. South African Journal of Geology 112, 89-108.

Dingle, R.V., Hendey, Q.B., 1984. Late Mesozoic and Tertiary sediment supply to the eastern Cape Basin (S.E. Atlantic) and palaeo-drainage systems in southwestern Africa. Marine Geology 56, 13-26.

Partridge, T.C., Botha, G.A., Haddon, I.G., 2006. Cenozoic deposits of the interior. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 585-604.

Pickford, M., Senut, B., Mein, P., Morales, J., Soria, D., Neito, M., Ward, J., Bamford, M. 1995. The discovery of Lower and middle Miocene vertebrates at Auchas, southern Namibia. Comptes Rendus de l' Académie des Sciences., Paris, Ser IIa, 322,901-906.

Plumstead, E.P., 1969. Three thousand million years of plant life in Africa. Geological Society of southern Africa, Annexure to Volume LXXII. 72pp + 25 plates.

Walker, S.J.H., Lukich, V., Chazan, M., 2014. Kathu Townlands: A high density Earlier Stone Age locality in the interior of South Africa. PLoS ONE 9(7).

Visual Impact Assessment

Clifford, K.H., Ghanbari, C.M. & Diver, R.B. 2009. Hazard analysis of glint and glare from concentrating solar power plants. Proceedings of the SolarPACES Conference. 15-18 September 2009. Berlin, Germany.

Clifford, H.H., Ghanbari, C.M. & Diver, R.B. 2011. Methodology to assess potential glint and glare hazards from concentrating solar power plants: analytical models and experimental validation. Journal of Solar Engineering Science. 133: 1-9.

Landscape Institute and Institute of Environmental Management Assessment. 2013. Guidelines for landscape and visual impact assessment. Oxon, UK: Routledge.

Oberholzer, B., 2005. Guidelines for involving visual and aesthetic specialists in EIA processes: Edition 1. (CSIR Report No. ENV-S-C 2005 053 F). Cape Town, South Africa: Provincial Department of the Western Cape, Department of Environmental Affairs & Development Planning.

United States Department of Interior. 2013. Best management practices for reducing visual impacts of renewable energy facilities on BLM-administered lands. Wyoming, United Stated of America: Bureau of Land Management.

Low, A.B. & Rebelo, A.G. (eds), 1996, Vegetation of South Africa, Lesotho and Swaziland. Department of Environmental Affairs & Tourism, Pretoria.

Mucina, L. & Rutherford, M.C. (eds.), 2006, The vegetation of South Africa, Lesotho and Swaziland, South African National Biodiversity Institute, Pretoria (Strelitzia series; no. 19).

Social Impact Assessment

Department of Energy (DoE). (2008). National Energy Act (No. 34 of 2008). Republic of South Africa.

Department of Energy (DoE). (2011). National Integrated Resource Plan for Electricity 2010-2030. Republic of South Africa.

Department of Energy (DoE). (2003). White Paper on Renewable Energy. Republic of South Africa.

Department of Environmental Affairs (DEA). (1998). National Environmental Management Act 107 of 1998 (No. 107 of 1998). Republic of South Africa.

Department of Environmental Affairs (DEA). (2010). National Climate Change Response Green Paper. Republic of South Africa.

Department of Justice (DoJ). (1996). The Constitution of the Republic of South Africa (Act 108 of 1996). ISBN 978-0-621-39063-6. Republic of South Africa.

Department of Minerals and Energy (DME). (1998). White Paper on Energy Policy of the Republic of South Africa. Republic of South Africa.

Environmental Planning and Design. (2019). Landscape and Visual Impact Assessment for the proposed McTaggarts PV1, near Upington in the Northern Cape Province.

International Finance Corporation (IFC). (2007). Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets. International Finance Corporation: Washington.

Interorganizational Committee on Principles and Guidelines for Social Impact Assessment. US Principles and Guidelines – Principals and guidelines for social impact assessment in the USA. Impact Assessment and Project Appraisal, 21(3): 231-250.

Kai !Garib Local Municipality. (2018). Kai !Garib Local Municipality Draft Integrated Development Plan 2018 / 2019.

National Development Agency (NDA). (2014). Beyond 10 years of unlocking potential. Available from: http://www.nda.org.za/?option=3&id=1&com_id=198 &parent_id= 186&com_task=1

National Planning Commission. (2012). National Development Plan 2030. ISBN: 978-0-621-41180-5. Republic of South Africa.

Northern Cape Provincial Government. (2012). Northern Cape Provincial Spatial Development Framework (PSDF) 2012.

Savannah Environmental (2014). Final Environmental Impact Assessment Report for the Sirius Solar PV Project One, Northern Cape Province.

Statistics South Africa. (2011). Census 2011 Community Profiles Database. Pretoria.

TerraAfrica Consult cc. (2020). Agricultural Compliance Statement for the Proposed Naledi PV Project.

United Nations Environment Programme (UNEP). (2002). EIA Training Resource Manual. 2nd Ed. UNEP.

United Nations Economic and Social Commission for Asia and the Pacific (UN). (2001). Guidelines for Stakeholders: Participation in Strategic Environmental Management. New York, NY: United Nations.

Vanclay, F. (2003). Conceptual and methodological advances in Social Impact Assessment. In Vanclay, F. & Becker, H.A. 2003. The International Handbook for Social Impact Assessment. Cheltenham: Edward Elgar Publishing Limited.

ZF Mgcawu District Municipality. (2018). ZF Mgcawu District Municipality Draft Integrated Development Plan (IDP) 2017 – 2022 (2018 / 2019)